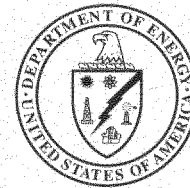


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Revision 1

April 2003

Project No. 23366



U.S. Department of Energy
Idaho Operations Office

Remedial Design/Remedial Action Work Plan, Phase II, for Waste Area Group 5



Idaho National Engineering and Environmental Laboratory

**DOE/ID-10798
Revision 1**

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April 2003

**Prepared for the
U.S. Department of Energy
Idaho Operations Office**

ABSTRACT

The Waste Area Group 5 remedial design/remedial action has been divided into two phases in an effort to accelerate the schedule for activities taking place at sites described herein. The remedial action is being performed in accordance with the *Final Record of Decision for Power Burst Facility and Auxiliary Reactor Area*. This Work Plan describes the activities that will occur during Phase II of the remedial design/remedial action. Specifically, Phase II includes the remediation of the Auxiliary Reactor Area (ARA)-01: ARA-I Chemical Evaporation Pond, ARA-12 ARA-III Radioactive Waste Leach Pond, and ARA-23: Radiologically Contaminated Surface Soil around ARA-I and ARA-II.

CONTENTS

ABSTRACT.....	iii
ACRONYMS.....	ix
1. INTRODUCTION	1-1
1.1 Work Plan Organization.....	1-2
1.2 Background	1-4
1.2.1 Auxiliary Reactor Area 01: ARA-I Chemical Evaporation Pond.....	1-4
1.2.2 Auxiliary Reactor Area 12: ARA-III Radioactive Waste Leach Pond	1-4
1.2.3 Auxiliary Reactor Area 23: Radiologically Contaminated Surface Soil and Subsurface Structures Associated with ARA-I and ARA-II.....	1-8
1.2.4 Power Burst Facility 16: SPERT-II Leach Pond.....	1-8
1.3 Selected Remedy.....	1-8
1.3.1 Institutional Controls in Waste Area Group 5.....	1-8
1.3.2 Additional Components of the Selected Remedy	1-11
2. DESIGN BASIS	2-1
2.1 General Description of the Project Components.....	2-1
2.1.1 Support Facilities	2-1
2.1.2 Electrical Power	2-1
2.1.3 Project Execution Services.....	2-1
2.2 Design Criteria	2-1
2.2.1 BBWI Management Control Procedures	2-1
2.2.2 Contaminated Soil Sites	2-2
2.3 DOE-Related Codes, Standards, and Documents	2-3
2.4 Engineering Standards	2-4
2.5 Environmental and Safety.....	2-4
2.6 Design Assumptions	2-5
2.7 Unresolved Issues	2-6
2.8 Quality Assurance.....	2-6
3. REMEDIAL DESIGN.....	3-1
3.1 Project Site	3-1

3.2	Site Contaminant Summary	3-1
3.2.1	Auxiliary Reactor Area 01: Chemical Evaporation Pond	3-1
3.2.2	Auxiliary Reactor Area 12: Radioactive Waste Leach Pond	3-1
3.2.3	Auxiliary Reactor Area 23: Radiologically-Contaminated Soil and Subsurface Structures	3-1
3.2.4	Power Burst Facility 16: SPERT-II Leach Pond.....	3-2
3.3	Site Preparation	3-2
3.4	Earthwork.....	3-2
3.5	Surface Water.....	3-3
3.6	Task-Site Staging	3-3
4.	HUMAN HEALTH AND ENVIRONMENTAL COMPLIANCE	4-1
4.1	Remedial Action Objectives	4-1
4.2	Applicable or Relevant and Appropriate Requirements	4-2
5.	REMEDIAL ACTION WORK PLAN.....	5-1
5.1	Relevant Changes to the Scope of Work.....	5-1
5.1.1	Auxiliary Reactor Area 25: ARA-I Soil beneath the ARA-626 Hot Cell	5-1
5.1.2	Power Burst Facilities 16: SPERT-II Leach Pond	5-1
5.1.3	Remediation Boundaries	5-1
5.2	Assumptions and Unresolved Issues	5-2
5.3	Work Tasks	5-2
5.3.1	Premobilization	5-2
5.3.2	Mobilization	5-2
5.3.3	Storm Water Management and Sediment Control	5-2
5.3.4	Clearing and Mowing the Site.....	5-2
5.3.5	Soil Excavation and Consolidation	5-3
5.3.6	Earthwork.....	5-3
5.3.7	Borrow, Haul, and Stockpile.....	5-4
5.3.8	Dust Suppression.....	5-4
5.3.9	Contaminated Soil Hauling	5-5
5.3.10	Reclamation Seeding.....	5-5
5.3.11	Demobilization.....	5-5
5.4	Summary of Site Activities	5-6
5.4.1	Auxiliary Reactor Area 01: ARA-I Chemical Evaporation Pond	5-6
5.4.2	Auxiliary Reactor Area 12: ARA-III Radioactive Waste Leach Pond	5-6
5.4.3	Auxiliary Reactor Area 23: Radiologically Contaminated Surface Soil and Subsurface Structures Associated with ARA-I and ARA-II.....	5-7

5.5	Field Oversight.....	5-8
5.5.1	Protocol and Coordination of Field Oversight	5-8
5.6	Project Cost Estimate	5-8
5.7	Project Schedule.....	5-8
5.8	Inspections	5-9
5.8.1	Prefinal Inspection	5-9
5.8.2	Prefinal Inspection Report.....	5-10
5.8.3	Final Inspection.....	5-11
5.9	Remedial Action Sampling and Analysis Plan	5-11
5.10	Health and Safety Plan.....	5-13
5.11	Waste Minimization Plan.....	5-13
5.12	Decontamination Plan	5-14
5.13	Spill Prevention/Response Program.....	5-14
5.14	Groundwater Monitoring	5-15
5.15	Operations and Maintenance Plan.....	5-15
5.16	Remedial Action Report.....	5-15
6.	FIVE YEAR REVIEW	6-1
7.	REFERENCES	7-1
Appendix A—Design Drawings for Waste Area Group 5 Remedial Design/Remedial Action Operable Unit 5-12 Phase II		
		A-1
Appendix B—Safety Category Designation and Record.....		
		B-1
Appendix C—Air Emissions from WAG 5 Contaminated Soil Remediation Activities		
		C-1
Appendix D—Waste Management		
		D-1
Appendix E—Cost Estimate		
		E-1
Appendix F—Environmental Checklist.....		
		F-1
Attachment 1—SPC-317, Revision 1, Construction Specification for Waste Area Group 5, Remedial Design/Remedial Action - Phase II		
		Att-1-1
Attachment 2—EDF-ER-178, Revision 3, WAG 5 OU 12 Phase II Remedial Action Soil Volume Minimization Strategy.....		
		Att-2-1

Attachment 3—EDF-1366, Revision 0, Haul Road Trade-Off Study	Att-3-1
Attachment 4—EDF-1573, Revision 0, ARA-23 Rock Decontamination	Att-4-1
Attachment 5—EDF-1772, Revision 1, ARA-01, ARA-12, and ARA-23 Contaminated Soil Removal Volume Estimate	Att-5-1
Attachment 6—EDF-ER-213, Revision 1, Result of FY 2000 Soil Sampling at the SPERT-II Leach Pond, CERCLA Site PBF-16, OU 5-12	Att-6-1
Attachment 7—EDF-ER-245, Revision 0, OU 5-12 Phase II Soil Removal – Global Positioning Radiometric Scanner System Calibration for Use at ARA-23 (INEEL/EXT-2000-01432)	Att-7-1
Attachment 8—INEEL/EXT-2000-0006, Revision 0, Cultural Resource Investigations for Waste Area Group 5 on the Idaho National Engineering and Environmental Laboratory	Att-8-1
Attachment 9—EDF-3318, Revision 0, In Situ Depth Profiling of Cs-137 Contamination in Soils at CERCLA Site Auxiliary Reactor Area 23, Operable Unit 5-12	Att-9-1

FIGURES

1-1. Idaho National Engineering and Environmental Laboratory.....	1-5
1-2. Auxiliary Reactor Area 01: ARA-I Chemical Evaporation Pond.....	1-6
1-3. Auxiliary Reactor Area 12: ARA-III Radioactive Waste Leach Pond.....	1-7
1-4. Auxiliary Reactor Area 23: ARA-I and ARA-II Radiologically Contaminated Soils.....	1-9
1-5. Power Burst Facility 16: SPERT-II Leach Pond	1-10
5-1. Project schedule.....	5-12

TABLES

4-1. Remediation goals and soil volumes for Waste Area Group 5 contaminated soil sites	4-2
4-2. Compliance with ARARs and TBCs for the Waste Area Group 5 contaminated soil sites	4-3
5-1. Start, completion, and enforceable dates for Phase II of the WAG 5 Remedial Design Remedial Action	5-9
5-2. Recommended institutional controls	5-16

ACRONYMS

ARA	Auxiliary Reactor Area
ARAR	applicable or relevant and appropriate requirement
BBWI	Bechtel BWXT Idaho, LLC
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
COC	contaminant of concern
D&D	decontamination and dismantlement
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy – Idaho Operations
EPA	U.S. Environmental Protection Agency
ER	environmental restoration
FFA/CO	Federal Facility Agreement and Consent Order
FSP	field sampling plan
FTL	field team leader
GPRS	global positioning radiometric scanner
HASP	health and safety plan
ICDF	INEEL CERCLA Disposal Facility
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
INEEL	Idaho National Engineering and Environmental Laboratory
LDR	land disposal restriction
mrem/hr	milli-roentgen equivalent man per hour
OU	operable unit
PBF	Power Burst Facility

PLN	plan
RadCon	radiological control
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RD/RA	remedial design/remedial action
RI/FS	remedial investigation/feasibility study
ROD	record of decision
SL-1	Stationary Low-Power Reactor No. 1
SOW	scope of work
SPERT	Special Power Excursion Reactor Test
SSSTF	Staging, Storage, Sizing, and Treatment Facility
TBC	to-be-considered
USC	United States Code
WAG	waste area group

Waste Area Group 5 Remedial Design/Remedial Action Work Plan, Phase II

1. INTRODUCTION

In accordance with the *Federal Facility Agreement and Consent Order* (FFA/CO) (U.S. Department of Energy – Idaho Operations [DOE-ID] 1991) between the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Idaho Department of Environmental Quality (IDEQ), hereafter referred to as the Agencies, DOE submits this remedial design/remedial action (RD/RA) Work Plan for the Auxiliary Reactor Area (ARA) and the Power Burst Facility (PBF). Under the current remediation management strategy outlined in the FFA/CO (DOE-ID 1991), the location identified for the remedial action is designated as Waste Area Group (WAG)-5, Operable Unit (OU) 5-12 at the Idaho National Engineering and Environmental Laboratory (INEEL). The remedial action for WAG 5 is divided into two phases. Phase I is specific to tanks and inactive waste systems located at the ARA. Phase II is concerned with the remediation of contaminated soil located at both ARA and PBF. Because of the proximity of one of the contaminated soil sites (ARA-25) to that of one of the tank sites (ARA-16), remediation of the site was included in Phase I. A separate work plan was previously submitted for Phase I.

The OU 5-12 remedial action, as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 United States Code [USC] § 6901 et seq.) process, will proceed in accordance with the signed Record of Decision (ROD) for WAG 5, *Final Record of Decision for Power Burst Facility and Auxiliary Reactor Area* (DOE-ID 2000a). The ROD presents the selected remedies for 55 individual sites evaluated under the WAG 5 comprehensive remedial investigation/feasibility study (RI/FS) (DOE-ID 1997). Of these 55 sites, the ROD (DOE-ID 2000a) provides information to support remedial actions for six sites at ARA and one at PBF where contamination presents an unacceptable risk to human health and the environment. No additional remediation will be conducted under CERCLA for the remaining 48 of the 55 sites in WAG 5. However, institutional controls will be maintained at 15 of these 55 sites and are addressed in this Phase II Work Plan. A “No Action” decision was made for the remaining 40 sites, because they were determined not to present an unacceptable risk.

The selected remedy for WAG 5 comprises three remedial actions to mitigate the risk associated with seven specific sites. The first remedial action addressed residual contamination in a sanitary waste system (ARA-02). The only principal threat identified in WAG 5, addressed by the third remedial action, was posed by the contents of an underground storage tank (ARA-16). The third remedial action addresses a collection of five individual sites (ARA-01, ARA-12, ARA-23, ARA-25, and PBF-16) where contaminated soil is the only source medium.

Of the three remedial actions, the two covering ARA-02 and ARA-16 were covered under the Phase I Work Plan. In addition, the Phase I Work Plan also covered the remediation of the soil associated with the ARA-I soil beneath the ARA-626 hot cells (ARA-25). This was done because the piping associated with ARA-16 intersected the soil and foundation associated with ARA-25. Additionally, four inactive waste systems were included in Phase I for closure as a best management practice. These sites includes the ARA-II seepage pit to the east (ARA-07), ARA-II seepage pit to the west (ARA-08), ARA-III sanitary sewer distribution box and septic tank (ARA-13), and ARA-IV test area septic tank and Leach Pit No. 2 (ARA-21). The results of the Phase I remedial activities were documented in the *Remedial Action Report for WAG 5, OU 5-12 Phase I Remedial Action; Sites ARA-02, ARA-16, ARA-25, and Inactive Waste System Sites ARA-07, ARA-08, ARA-13, and ARA-21* (DOE-ID 2002a). Following completion of the remedial activities and closure actions, two of the inactive waste system sites (ARA-07

and ARA-08) were designated as requiring institutional controls because of the presence of Cs-137 in the dry sludges that remained at the sites.

The remediation of the four remaining contaminated soil sites is covered under this Phase II Work Plan. The four sites requiring remedial action under this Work Plan include the following:

- ARA-I Chemical Evaporation Pond (ARA-01)
- ARA-III Radioactive Waste Leach Pond (ARA-12)
- Radiologically Contaminated Surface Soil in and around ARA-I and ARA-II (ARA-23)
- Special Power Excursion Reactor Test (SPERT)-II Leach Pond (PBF-16) (no remedial action required).

To note, as discussed in Section 5.1.2, no remediation of PBF-16, SPERT-II Leach Pond, is being considered under this Work Plan based upon the sampling effort conducted during the summer of 2000. Management of stored and investigation-derived waste and groundwater monitoring are also components of the selected remedy. These are discussed further herein.

1.1 Work Plan Organization

The RD/RA of WAG 5 is divided into two phases. Phase I involved those activities as discussed above. An institutional control status report is submitted annually for the 15 sites identified in the ROD (DOE-ID 2000a) as requiring controls as well as the two inactive waste system sites identified in the Phase I RA Report (DOE-ID 2002a). Phase II covers the contaminated soil sites, management of the stored and investigation-derived waste, and groundwater monitoring aspects of the RD/RA. Phase II also provides the operations and management, and institutional control plan components of the remedial action.

This Work Plan outlines the major activities to be implemented in performing Phase II of the RD/RA of WAG 5 in accordance with the ROD (DOE-ID 2000a). The plan describes the sites, contaminants, project management, tasks, schedules, and cost estimates. The following are brief descriptions of the Work Plan sections and appendices:

- Section 1 describes the background and history of WAG 5 and provides an overview of the selected remedies for the areas of concern.
- Section 2 provides the design criteria, including the design codes and standards, assumptions, and quality assurance.
- Section 3 discusses the remedial design of the project. A summary of the required activities is presented.
- Section 4 is the initial evaluation of the contaminated soil sites at WAG 5, including an evaluation of the potential risks to human health and the environment. Descriptions of existing site conditions, potential migration and exposure pathways, and an assessment of exposure routes are provided. Also, the remedial action objectives (RAOs) and applicable or relevant and appropriate requirements (ARARs) are identified.

- Section 5 outlines the OU 5-12 remedial action work plan. This section includes the necessary steps and documentation required for completing the remedial action of the contaminated soil sites as described in Sections 1 through 4. The required work tasks, project cost estimates, inspections, environmental and safety plans, and sampling and analysis plans are discussed in this section.
- Section 6 describes the necessary actions involved for each five-year review to occur after the remedial action has taken place.
- Section 7 is a listing of the reference material.
- Appendix A, Design Drawings, contains drawings that detail the present conditions (e.g., topography and fencing) at each site, as well as the work to be performed during the remedial action.
- Appendix B, the Safety Category Designation and Record, assigns the remedial action as being consumer grade.
- Appendix C, Air Emissions Modeling Results, presents a summary of the results of the air emissions to satisfy project ARARs.
- Appendix D describes the management and disposal of waste generated during Phase II activities.
- Appendix E provides the cost estimate, basis for the estimate, and related assumptions.
- Appendix F contains an environmental checklist.
- Attachment 1, Technical Specifications, contains the technical specifications that provide the general terms and conditions required for completion of the remedial action.
- Attachments 2 through 7 contain engineering design files with technical information pertaining to the project.
- Attachment 8, the Cultural Resource Summary, describes the cultural resource investigations, conclusions, and recommendations for WAG 5.
- Attachment 9 presents the results from in situ measurements performed during the summer of 2002.

In addition, five separate documents are associated with the Work Plan:

- The Field Sampling Plan (FSP) (DOE-ID 2003a) describes the sampling and analyses required during Phase II activities.
- The Groundwater Monitoring Plan (DOE-ID 2003b) describes the sampling and analyses required to assess any potential impact that WAG 5 sites may have had on the Snake River Plain Aquifer.
- The Quality Assurance Project Plan (QAPjP) (DOE-ID 2002b) describes the necessary steps required to ensure the quality of project data.
- The Health and Safety Plan (HASP) (INEEL 2003) describes the possible hazards and the required steps to protect the health and safety of the workers.

- The Operations and Maintenance Plan (DOE-ID 2000b) describes the long-term operations and maintenance activities that will be conducted at WAG 5, and includes the Institutional Control Plan that outlines the institutional control requirements for the WAG 5 sites.

1.2 Background

Located 51 km (32 mi) west of Idaho Falls, Idaho, the INEEL is a government-owned/contractor-operated facility managed by the DOE-ID (Figure 1-1). Occupying 2,305 km² (890 mi²) of the northeastern portion of the Eastern Snake River Plain, the INEEL encompasses portions of five Idaho counties: (1) Butte, (2) Jefferson, (3) Bonneville, (4) Clark, and (5) Bingham.

Comprising the ARA and PBF, WAG 5 is in the south-central portion of the INEEL. The ARA consists of four separate operational areas designated as ARA-I, ARA-II, ARA-III, and ARA-IV. Activities conducted by the INEEL decontamination and dismantlement (D&D) organization have resulted in the removal of all structures at the ARA facilities with the exception of a few buildings and facilities remaining at ARA-IV. Once known as the SPERT facilities, PBF consists of five separate operational areas: the PBF Control Area, the PBF Reactor Area (SPERT-I), the Waste Engineering Development Facility (SPERT-II), the Waste Experimental Reduction Facility (SPERT-III), and the Mixed Waste Storage Facility (SPERT-IV). Collectively, the Waste Engineering Development Facility, and the Mixed Waste Storage Facility are known as the Waste Reduction Operations Complex. The following sections describe the physical attributes of each of the contaminated soil sites destined for remediation under the terms outlined in this Work Plan.

1.2.1 Auxiliary Reactor Area 01: ARA-I Chemical Evaporation Pond

The ARA-01 site (Figure 1-2) is a shallow, unlined surface impoundment, roughly 30 × 90 m (100 × 300 ft) that was used to dispose of laboratory wastewater from the ARA-I Shop and Maintenance Building (ARA-627). Located southeast of ARA-I, the pond was constructed in 1970 by excavating soil to create a shallow topographic depression. Basalt outcrops are present within and immediately adjacent to the pond. The subsurface immediately beneath the pond consists of fracture and rubble zones. No interbed was found within the first 36 m (118 ft) of the surface.

1.2.2 Auxiliary Reactor Area 12: ARA-III Radioactive Waste Leach Pond

The ARA-12 site (Figure 1-3) is an unlined surface impoundment with approximate dimensions of 50 × 115 m (150 × 370 ft). The pond was constructed in a natural depression west of ARA-III to dispose of low-level liquid waste from reactor research operations. Liquid waste was stored temporarily in tanks then transferred to the leach pond via an underground pipe. Effluent contained low-level radioactive material. A second separate discharge line originated in an uncontaminated water storage tank. The pond also received facility run-off through a culvert. The ARA-III facility was an active reactor research facility from about 1959 to 1965. From 1966 to 1987, activities at ARA-III were limited to component and instrumentation testing, instrumentation development and fabrication, and chemical research. Waste associated with these activities was not disposed of in the leach pond, and the only discharges to the pond during this period were from the water storage tank and facility run-off. The facility was shut down in 1987, leaving the pond dry except during spring run-off and heavy precipitation. In 1991, the culvert was plugged in preparation for D&D operations at ARA-III, and in 1993, the tanks and waste lines to the leach pond were removed.

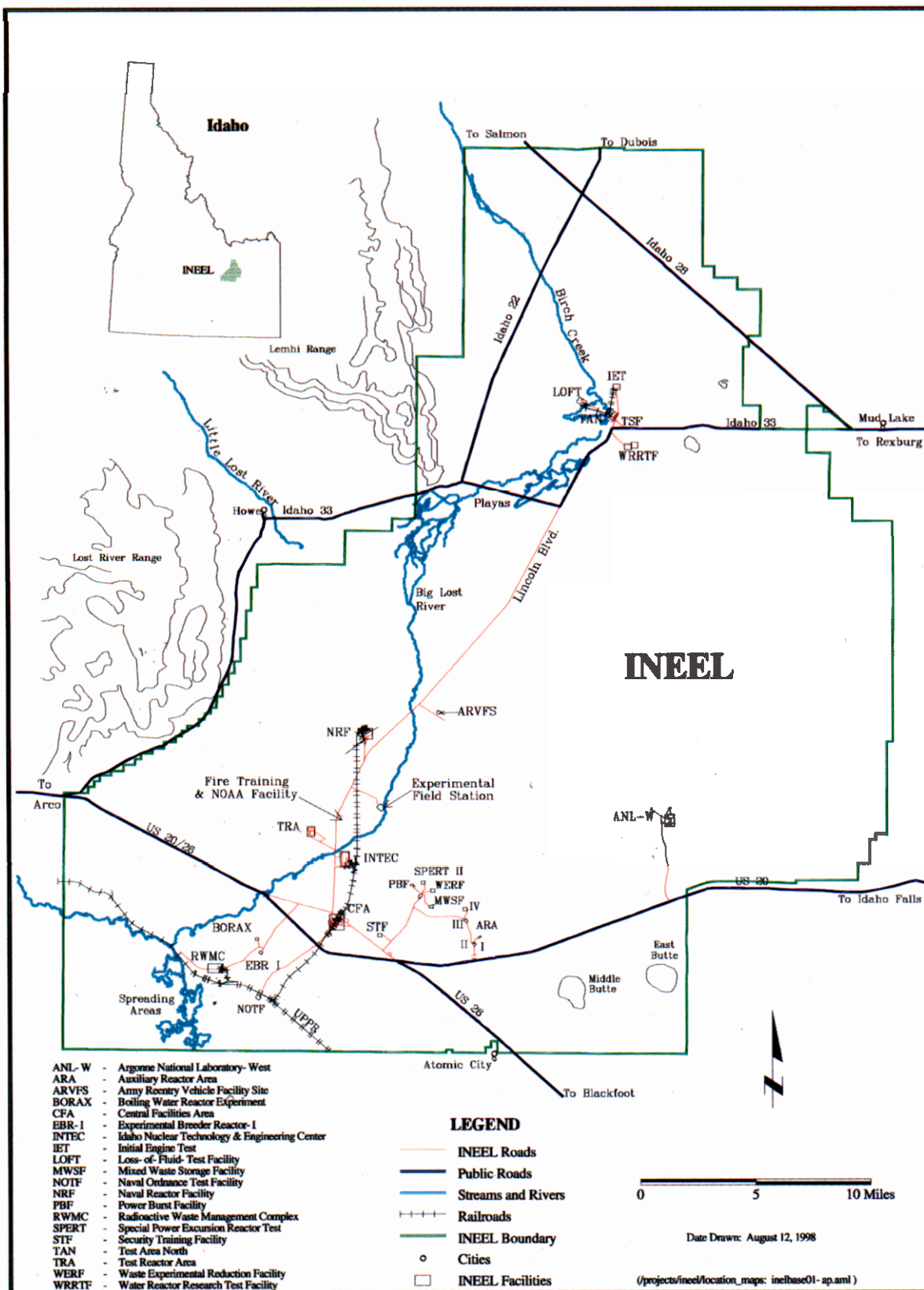


Figure 1-1. Idaho National Engineering and Environmental Laboratory.

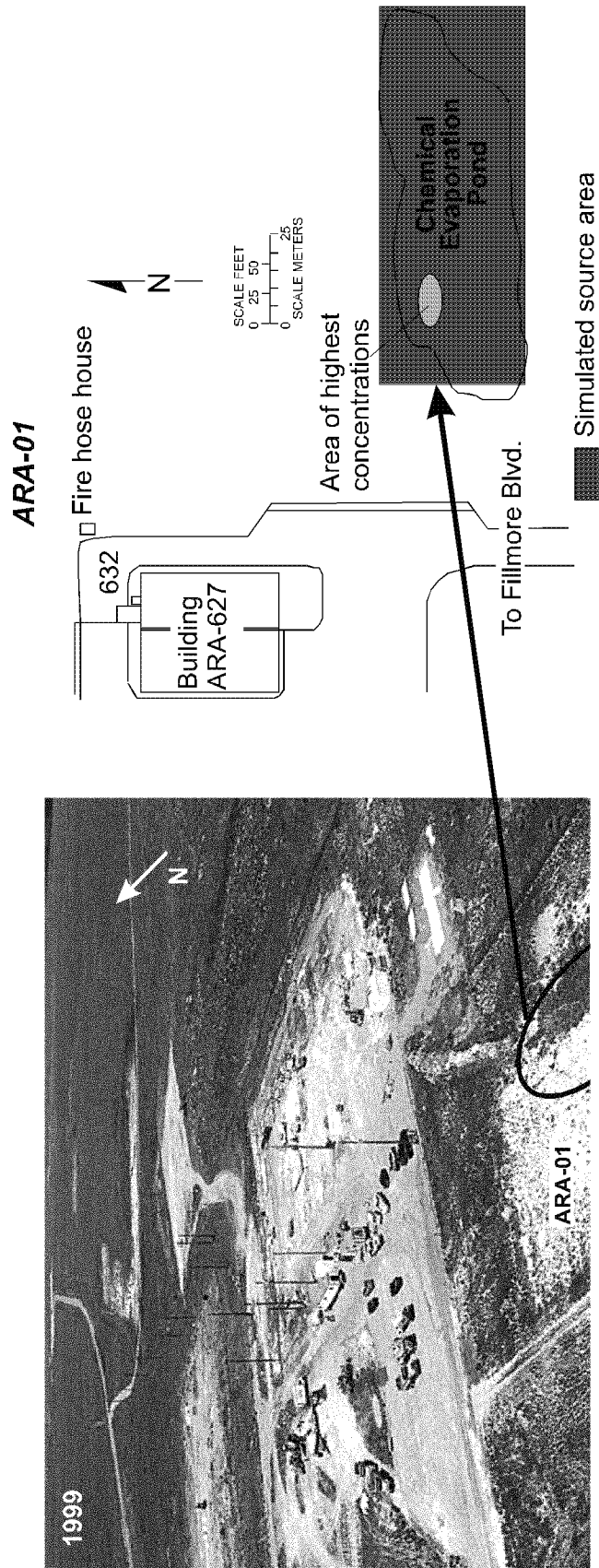


Figure 1-2. Auxiliary Reactor Area 01: ARA-I Chemical Evaporation Pond.

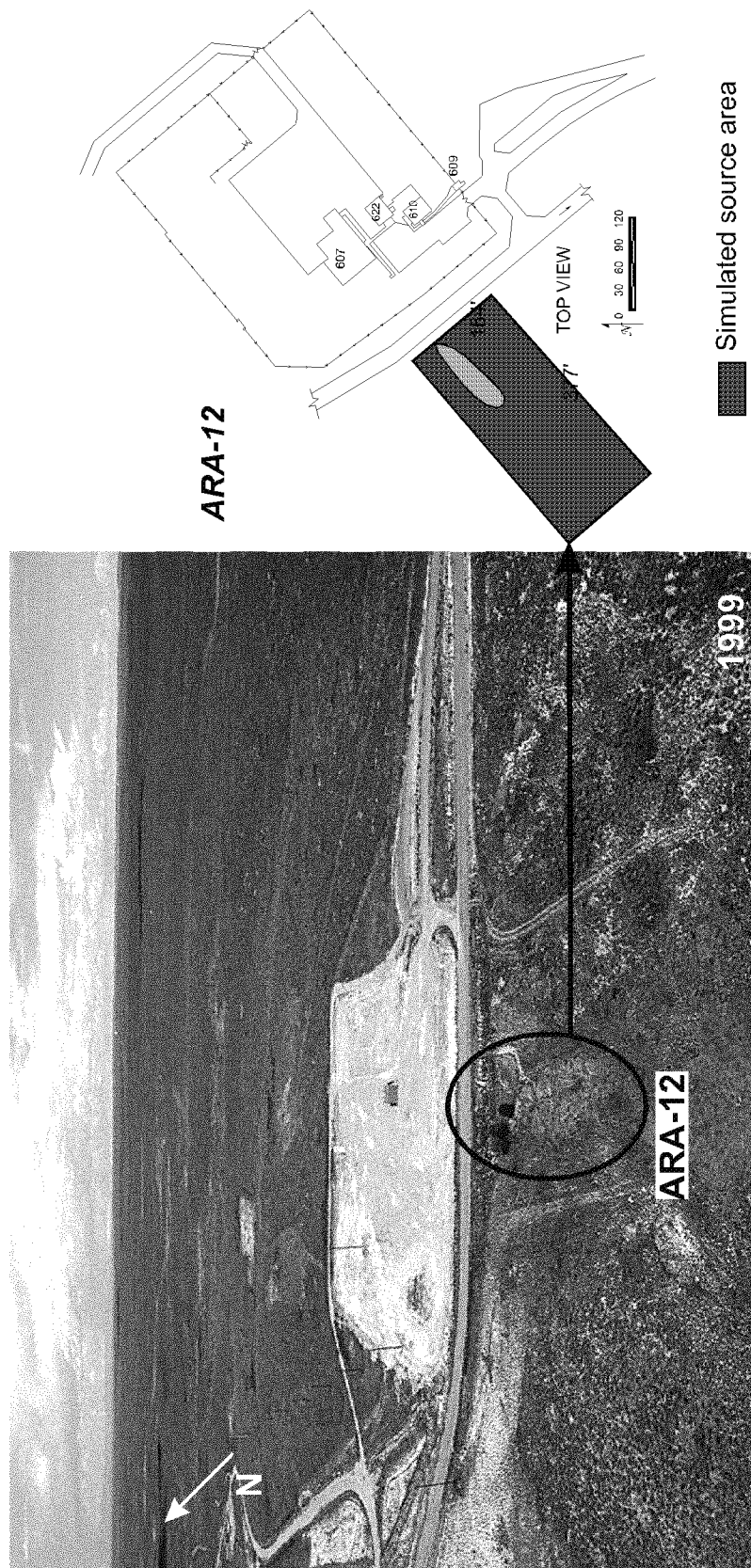


Figure 1-3. Auxiliary Reactor Area 12: ARA-III Radioactive Waste Leach Pond.

1.2.3 Auxiliary Reactor Area 23: Radiologically Contaminated Surface Soil and Subsurface Structures Associated with ARA-I and ARA-II

The ARA-23 site (Figure 1-4) is a 97-ha (240-acre) windblown contamination area including ARA-I and II. Of the 97 ha (240 acres), 17 ha (42 acres) exceed risk-based concentrations and require remediation. The site also contains subsurface structures remaining after D&D activities within the ARA-I and ARA-II facilities. The soil was radiologically contaminated by the 1961 Stationary Low-Power Reactor-1 (SL-1) accident and subsequent cleanup. Minor amounts of contamination may have been added by other ARA operations. Over time, winds dispersed the contamination over an area roughly 100 ha (240 acres), but soil concentrations over most of the area are significantly less than risk-based remediation goals. The long axis of the roughly oval-shaped site is consistent with the generally southwest-to-northeast winds common at the INEEL.

1.2.4 Power Burst Facility 16: SPERT-II Leach Pond

The PBF-16 site (Figure 1-5) is a fenced, unlined surface impoundment, approximately 51 × 70 m (167 × 230 ft), located south of the SPERT-II Reactor Building. A 10-cm (4-in.) vitrified clay drainpipe originating at the reactor building and terminating at the leach pond was used to convey waste effluent to the leach pond. The outlet for the clay drainpipe rests on a concrete and rock apron in the northwest corner of the pond basin. From 1959 to 1964, the leach pond was used for disposal of demineralizer effluent, water-softener waste, emergency shower drain water, and discharges from the floor drains of the reactor building. From 1964 to 1990, the only discharge to the pond was clean water from the PBF maintenance shop air compressor (Hillman-Mason et al. 1994). Currently, there is no discharge to the pond.

1.3 Selected Remedy

Based on consideration of the requirements of CERCLA, the detailed analysis of alternatives, and public comments, the Agencies have selected removal and disposal of contaminated soil as the remedy for the contaminated soil sites at OU 5-12. Performance standards were implemented as design criteria for each site to ensure the selected remedy protects human health and the environment. Five-year reviews will be used to ensure the selected remedies remain protective and appropriate.

1.3.1 Institutional Controls in Waste Area Group 5

Institutional controls will be applied initially to 15 of the 55 sites in WAG 5. As described in the Phase I Remedial Action Report (DOE-ID 2002a), institutional controls will also apply to two of the inactive waste system sites not originally designated as requiring such controls. In accordance with the ROD (DOE-ID 2000a), institutional controls will not be required for the remaining 38 sites. Institutional controls will be maintained in the interim until the selected remedy has been implemented at six of the seven sites (i.e., ARA-01, ARA-02, ARA-12, ARA-16, ARA-23, and ARA-25) identified for remediation in the ROD (DOE-ID 2000a) and will remain in effect until it is determined during a 5-year review that the controls are no longer necessary for a given site. Interim controls are not required for PBF-16, a site identified for remediation based on ecological risk from exposure to mercury. The site will be evaluated for institutional controls in the final remedial action report for WAG 5. Long-term institutional control requirements for these sites will be determined based on the analysis of postremediation confirmation samples.

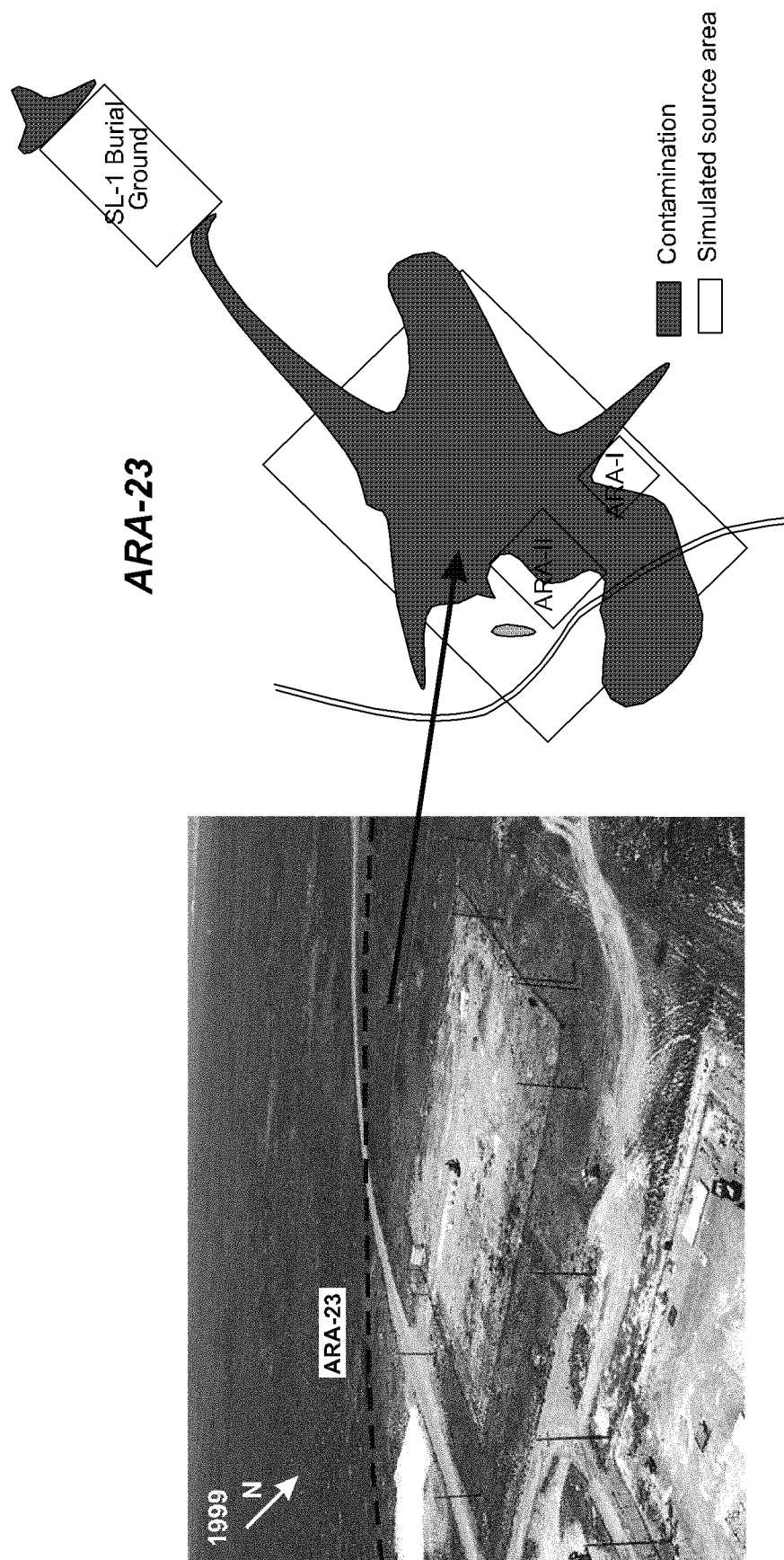


Figure 1-4. Auxiliary Reactor Area 23: ARA-I and ARA-II Radiologically Contaminated Soils.

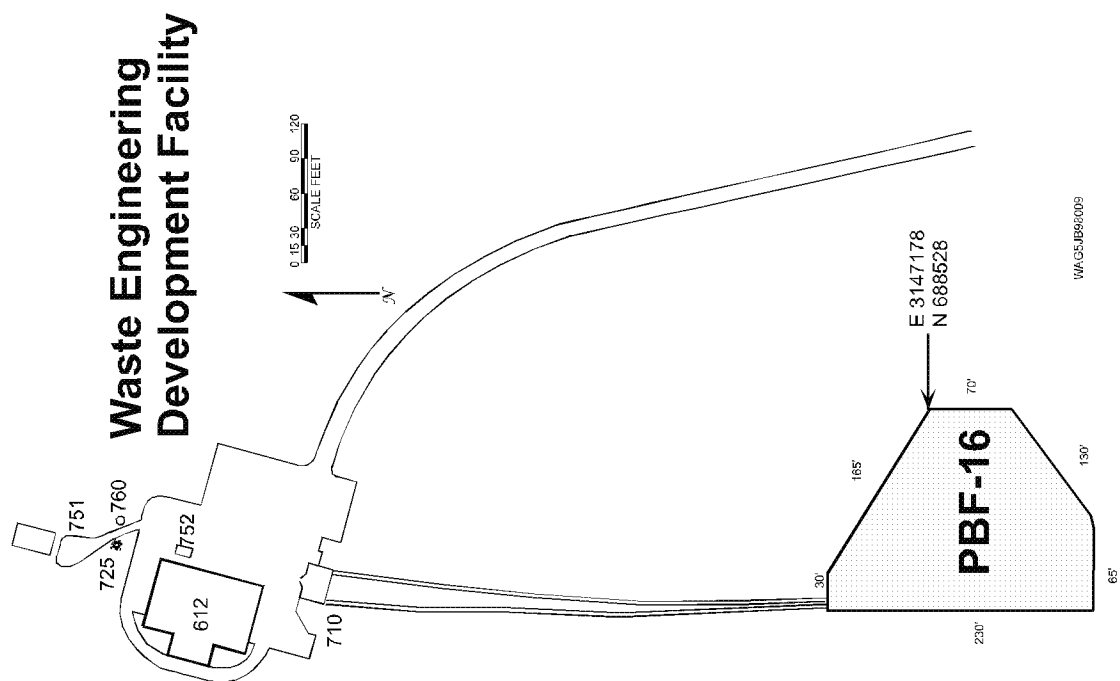


Figure 1-5. Power Burst Facility 16: SPERT-II Leach Pond.

In addition to the six sites requiring remediation and the two sites identified in the Phase I Remedial Action Report (DOE-ID 2002a), institutional controls will be maintained by the Department of Energy (DOE) at nine additional CERCLA sites within WAG 5 where the risk is greater than 1E-04 for a hypothetical current residential scenario. However, baseline risk assessments at the INEEL typically do not estimate risk for a current residential scenario (INEEL 1995). For purposes of evaluating the need for institutional controls at WAG 5, the potential for current residential risk in excess of 1E-04 was inferred from the risk assessment for the 100-year future residential scenario. Any site with a 100-year future residential scenario with an estimated risk of 1E-06 or greater was assumed to pose a current residential risk of 1E-04. Institutional controls will remain in place at each of these nine sites for at least 100 years or until the site is released for unrestricted use in a 5-year review.

Three of the nine sites (i.e., ARA-06, ARA-24, and PBF-13) are landfill sites. For the ARA-06 site, an estimated baseline risk of 1E-01 for the 100-year future residential scenario exists diminishing to 1E-04 in approximately 400 years from exposure to radiologically-contaminated soil and waste. For the ARA-24 site, the estimated baseline risks are less than 1E-06 for all scenarios; however, a highly radioactively contaminated pipeline embedded in concrete remains 6.1 m (20 ft) below grade. No unacceptable risk exists for the PBF-13 site; however, the site contains construction waste including possibly friable asbestos. Risk estimates for the 100-year future residential scenario for residual soil contamination at the other six sites (i.e., ARA-03, PBF-10, PBF-12, PBF-21, PBF-22, and PBF-26) are less than 1E-04. However, for a residential scenario, risks for these sites may be greater than 1E-06 before the end of institutional control (i.e., 2095). An institutional control plan has been prepared and is discussed in Section 5.15. The list of sites requiring institutional controls will change over time as remediation is completed and 5-year reviews are conducted.

1.3.2 Additional Components of the Selected Remedy

In addition to remediating specific sites, several activities have been implemented at WAG 5 to complete the selected remedy. These activities, including disposition of stored and investigation-derived waste and groundwater monitoring, are discussed in the following sections.

1.3.2.1 Disposition of Stored Waste and Investigation-Derived Waste. In 1996, the contents of the three ARA-02 septic tanks, a total of approximately 5,700 L (1,500 gal), were removed and placed in 31 208-L (55-gal) drums. The decontamination waste (diesel) and debris from the removal action and investigation-derived waste from the ARA-16 sampling filled an additional 24 drums. The 55 drums were placed in compliant storage at the ARA-I facility near the septic system.

In August 1999, several storage drums, comprised of sample bottles containing unaltered sample material from the three ARA-02 septic tanks and the seepage pit, were consolidated into four drums representing the three tanks and the pit. The emptied and decontaminated sample bottles were placed in two drums, which were disposed of at the Radioactive Waste Management Complex in June 2000. Ten drums of nontoxic regulated waste (Toxic Substance Control Act) originating from tank 1 and 15 drums from tank 3 were shipped to the Mixed Waste Storage Facility at the INEEL where the waste was subsequently prepared for incineration at the Waste Experimental Reduction Facility. Repackaging and incineration of these 25 drums of waste were completed in April 2000. Twenty-one drums remain in compliant storage due to the consolidation of sample material and treatment and disposal of the noted drums. The remaining drums consist of the following:

- Nine drums of sludge from septic tank #2
- One drum of diesel fuel used for decontamination

- Two drums of personal protective equipment (PPE) and investigation-derived waste generated during the ARA-729 tank sampling level measurement activities
- Nine drums of debris (i.e., PPE, rock, concrete, wood, and plastic) generated during the ARA-02 removal action.

Contaminated media such as soil, debris, liquids, sample residue, sampling, equipment, and personal protective equipment, not identified by the INEEL FFA/CO (DOE-ID 1991) or in the comprehensive investigation have been or may be generated as a result of RD/RA activities at WAG 5. Procedures to address the remediation waste are documented in Appendix D. In addition, legacy waste that has been generated as a result of previous sampling activities at WAG 5 will be appropriately characterized, assessed, and dispositioned in accordance with regulatory requirements to achieve remediation goals consistent with remedies selected for sites in the ROD (DOE-ID 2000a). A summary of the disposition status of WAG 5 remediation waste has been and will continue to be provided in the annual institutional controls status report of which the *Institutional Controls Status Report for the Power Burst Facility and Auxiliary Reactor Area, Operable Unit 5-12, for the Year 2002* (DOE-ID 2002c) is the most recent.

1.3.2.2 Groundwater Monitoring. Because the potential for groundwater contamination associated with sources within WAG 5 is low, groundwater monitoring was discontinued after 1997. This decision was based on data from the analysis of samples collected from eight wells in WAG 5 in 1995 and 1997 and the results of the groundwater modeling conducted in the WAG 5 baseline risk assessment (Holdren et al. 1999). Surveillance monitoring of the groundwater beneath the ARA and PBF facilities has resumed as a component of the selected remedy for WAG 5 as specified in the ROD (DOE-ID 2000a). Groundwater monitoring is not required to satisfy WAG 5 remedial action objectives or cleanup goals, but supports the INEEL Sitewide assessment (i.e., WAG 10). Samples have been collected beginning within a year of the date of the ROD signature, and sampling will continue at a minimum annually, at least until the first 5-year review for the ROD (DOE-ID 2000a). At that time, the need for continued groundwater monitoring will be assessed. The groundwater-monitoring plan (DOE-ID 2003b) defines the sampling and analytical requirements.

2. DESIGN BASIS

2.1 General Description of the Project Components

The project components (support facilities, electrical power, and project execution services) are described in the following subsections.

2.1.1 Support Facilities

The support facilities to be used during field operations include field office trailer(s), parking area, and lay-down areas. The subcontractor will be required to supply trailer(s) for field use. Parking for personnel vehicles is available at the ARA-I facility. Lay-down areas will be designated at each of the task sites.

2.1.2 Electrical Power

Electrical power is available at the ARA-I and ARA-II sites for field operations use. Power at ARA-III can be made available as necessary.

2.1.3 Project Execution Services

Project execution services (e.g., ensuring design specifications are met, reviewing and improving construction interface documents) will be provided by Bechtel BWXT Idaho, LLC (BBWI), on an as-needed basis. In addition, engineering support will be provided during prefield operations activities, field operations activities, and at field operations closeout. During field operations activities, appropriate BBWI personnel will review and evaluate field changes.

2.2 Design Criteria

2.2.1 BBWI Management Control Procedures

The project definition, project planning, project execution, and project acceptance and closeout phases will be performed in compliance with pertinent BBWI internal company procedures. Pertinent internal company procedures for this project are those identifying requirements in the following areas:

- Engineering design
- Emergency preparedness and management
- Fire protection
- Management systems
- Occupational safety and health
- Radiological protection
- Security
- Environmental restoration

- Waste management
- Conduct of maintenance
- Quality
- Cultural resources.

The objective of this remedial action is to inhibit the potential exposure for human and environmental receptors, and to minimize the spread of contamination. The following section describes the activities at the contaminated soil sites covered under Phase II activities.

2.2.2 Contaminated Soil Sites

The selected remedy for the WAG 5 contaminated soil sites is removal and disposal of the contaminated soil at the INEEL. For the purpose of this Work Plan, contaminated soil is defined as that exceeding the RAOs. This remedy was selected based on the results of the comparative analysis of alternatives. It is the least costly alternative that meets threshold criteria (i.e., the remedy provides overall protection of human health and the environment and satisfies ARARs), is easily implemented because the required equipment is readily available at the INEEL, and the long-term effectiveness is high because contamination will be permanently removed from the sites. The estimated time required to complete remediation is 18 to 24 months. The following activities will be conducted to complete remediation of the remaining contaminated soil sites.

- Soil contaminated with concentrations in excess of the remediation goals will be removed using conventional earth-moving equipment (e.g., scrapers, backhoes, and shovels). Remediation goals are identified in Section 4.1.
- Real-time analysis will be used before and during excavation to delineate the extent of contamination for removal. Soil sampling and laboratory analyses will be used to verify that remediation goals have been satisfied.
- Areas that have been excavated to depths greater than 0.3 m (1 ft) may be backfilled with uncontaminated soil or sloped to promote drainage. All excavations will be contoured to match the surrounding terrain and vegetated.
- Contaminated soil will be characterized and sent to the INEEL CERCLA Disposal Facility (ICDF) for permanent disposal.
- Institutional controls consisting of signs, access controls, and land-use restrictions will be maintained until remediation is complete. Post-remediation institutional control requirements will be identified based on the results of post-remediation sampling. Institutional controls will not be required after remediation if all contaminated media are removed or if contaminant concentrations allow unrestricted use of the site. Institutional controls that are implemented will be maintained until discontinued based on the results of a 5-year review.
- Five-year reviews will be conducted for remediated sites with institutional controls.

Removing contaminated soil will be achieved using conventional excavation equipment. The relatively shallow depths of contaminated soil at WAG 5 sites will allow for excavation using front-end loaders, backhoes, and soil vacuum equipment.

Areas planned for excavation will be gridded, characterized, and excavated in discrete depth intervals. Real-time in situ field measurement techniques will be used both before and during excavation to delineate the extent of contamination for removal and to reduce the volume of uncontaminated soil removed. Following any excavation activities, the in situ field surveys using the global positioning radiometric scanner (GPRS) system will be performed only over those areas where actual excavation has taken place. If the surveys must proceed over potentially contaminated areas, the survey will proceed from the “clean” to “dirty” area to mitigate the spread of contamination back onto remediated soils. In order to ensure that no contamination is spread onto a previously remediated area, the vehicle will be surveyed by RadCon before leaving a contaminated area. Excavation will proceed only to the depths at which contamination above the remediation goals is encountered. Sampling and analysis of soil underlying clean intervals will be used to verify that all soil with contaminant concentrations above the remediation goals is removed.

Current radiological control practices will be implemented to minimize radiation exposure to the operators. Radiological controls could consist of limiting the amount of time an operator can work in the area, requiring personnel to wear personal protective clothing, and using distance and shielding to reduce radiation exposure. Air emissions will be controlled by using water sprays or soil fixatives to suppress dust during soil excavation and removal. Air monitoring will be performed as required as outlined in Section 5.3.5. In addition, shipping containers will have disposable plastic liners installed, and tarps will be unrolled over the dump truck boxes or roll-off containers and secured to prevent accidental release during transit.

Dump trucks or trucks with roll-off containers will be positioned near the excavation so that loaders and backhoes can place the contaminated soil directly into the dump truck or container. The trucks or containers on trucks will have contaminated soil removed from exterior surfaces prior to transport. Soil will then be transported to the ICDF for disposal.

Though existing paved roadways between WAG 5 and the proposed location near the Idaho Nuclear Technology and Engineering Center for the ICDF could be used, it was believed that the transportation distance could be greatly reduced by using the existing two-track dirt road between PBF and the Idaho Nuclear Technology and Engineering Center. However, a trade-off study conducted during spring 2000 and summarized in the Engineering Design File, Attachment 3, concludes that the risks associated with transportation are fairly low and do not justify the expense of constructing the necessary roadway. In addition, archeological concerns would require the pathway to be adjusted so as to avoid those areas containing sensitive Native American and/or historical artifacts.

Following remediation, excavations exceeding 0.3 m (1 ft) in depth will be backfilled with uncontaminated soil or sloped to promote drainage. Shallow excavations will be contoured to blend with the existing landscape. Sites will be vegetated in accordance with INEEL guidelines (DOE-ID 1989).

Post-remediation requirements for institutional controls at each soil site (e.g., signs, access controls, and deed restrictions) will be determined after soil removal. Institutional controls will not be required after remediation if all contaminated media are removed or if contaminant concentrations allow unrestricted use of the site. Institutional controls that are implemented will be maintained until discontinued based on the results of a 5-year review.

2.3 DOE-Related Codes, Standards, and Documents

The following DOE-related codes, standards, and documents will be used as the basis for the remediation of OU 5-12:

- DOE-ID 2000a, *Final Record of Decision for Power Burst Facility and Auxiliary Reactor Area, Operable Unit 5-12*

- DOE Order 5480.4, “Environmental Protection, Safety, and Health Protection Standards”
- DOE Order 435.1, Chapter IV, “Radioactive Waste Management”
- DOE Order 5400.5, “Radiation Protection of the Public and the Environment”
- DOE Order 414.1, “Quality Assurance”
- DOE Order 232.1A, “Occurrence Reporting and Processing of Operations Information”
- DOE Order 231.1, “Environment, Safety, and Health Reporting”
- DOE Order 440.1A, “Worker Protection Management for DOE Federal and Contractor Employees”
- DOE Order 470.1, “Safeguards and Security Program”
- 10 Code of Federal Regulations (CFR) 830.120, “Quality Assurance Requirements”
- 10 CFR 835, “Occupational Radiation Protection.”

2.4 Engineering Standards

Attachment 1 contains references to the latest engineering standards and the specifications to which they apply.

2.5 Environmental and Safety

The following is a list of potential chemical-specific and action-specific ARARs identified in the ROD. A detailed discussion of the ARARs is presented in Section 4.2.

Action-Specific ARARs:

- Idaho Administrative Procedures Act (IDAPA) 58.01.01.161, “Toxic Substances”
- IDAPA 58.01.01.585, “Toxic Air Pollutants Non-Carcinogenic Increments”
- IDAPA 58.01.01.586, “Toxic Air Pollutants Carcinogenic Increments”
- IDAPA 58.01.01.650 and .651, “Fugitive Dust”
- IDAPA 58.01.01.500.02, “Registration Procedures and Requirements for Portable Equipment – Compliance with Rules and Regulations”
- 40 CFR 61.92, “National Emission Standards for Hazardous Air Pollutants – Standard”
- 40 CFR 61.93, “National Emission Standards for Hazardous Air Pollutants – Emission Monitoring and Test Procedures”

- 40 CFR 61.94, “National Emission Standards for Hazardous Air Pollutants – Compliance and Reporting”
- IDAPA 58.01.05.008 [40 CFR 264.13(a)(1-3)], “General Waste Analysis”
- IDAPA 58.01.05.008 (40 CFR 264.15), “General Inspections”
- IDAPA 58.01.05.008 (40 CFR 264, Subpart C), “Preparedness and Prevention”
- IDAPA 58.01.05.008 (40 CFR 264, Subpart D), “Contingency Plan and Emergency Procedures”
- IDAPA 58.01.05.008 (40 CFR 264.114), “Equipment Decontamination”
- IDAPA 58.01.05.008 (40 CFR 264.171-177), “Use and Management of Containers”
- IDAPA 58.01.05.011 [40 CFR 268.40 (a)(b)(e)], “Applicability of Treatment Standards”
- IDAPA 58.01.05.011 [40 CFR 268.45 (a-d)], “Treatment Standards for Hazardous Debris”
- IDAPA 58.01.05.011 [40 CFR 268.48 (a)], “Universal Treatment Standards”
- IDAPA 58.01.05.011 (40 CFR 268.49), “Alternative LDR [land disposal restriction] Treatment Standards for Contaminated Soil.”

Location-Specific ARARs

- 16 USC 470 h-2, “Historic Properties Owned or Controlled by Federal Agencies”
- 36 CFR 800.4, “Identification of Historic Properties”
- 36 CFR 800.5, “Assessment of Adverse Effects”
- 25 USC 3002 (43 CFR 10.6), “Ownership”
- 25 USC 3005 (43 CFR 10.10), “Repatriation.”

2.6 Design Assumptions

The assumptions under which the RD/RA activities will be performed for the remediation of WAG 5 contaminated soil are as follows:

- The majority of the ARA-23 cesium-137 contamination is in the top 7.6 cm (3 in.)
- Decontamination of rocks on the surface will not be performed before the soil remediation activities are addressed herein
- The ICDF will accept all waste generated as a result of this remedial action
- All soil contaminated with concentrations in excess of the remediation goals will be removed using conventional, earth-moving equipment until the remediation goals are met, contaminant concentrations are comparable to background levels, or soil is removed to basalt.

2.7 Unresolved Issues

The primary remaining unresolved issues that affect the WAG 5 remedial action is whether the ICDF will be available to accept WAG 5 waste during the remediation period. A second issue concerns the path forward if contaminated basalt is encountered. The basalt may or may not be able to be decontaminated through techniques such as dry sweeping any soil remaining in surface fractures of the basalt. If these techniques are not successful, some form of institutional controls may be required.

2.8 Quality Assurance

A Safety Category Designation and Record included in Appendix B has been prepared for all the activities of the project. A hazard category of less than 3 has been deemed appropriate for this project. All design, procurement, and field operations activities will be consumer grade in accordance with the less than 3 hazard category designation.

The *Project Management Plan—Environmental Restoration Program Management* (INEEL 2000a), hereinafter referred to as the *Project Management Plan*, has been adopted for this project and is incorporated by reference. The guidance governs the functional activities, organization, and quality assurance/quality control (QA/QC) protocols that will be used for this project. The *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2002b) has also been adopted for this project. This plan governs the QA/QC requirements for data.

Where applicable, the project specifications (Attachment 1) will specify the QA/QC procedures for the given task, consistent with guidance provided by the project management plan, (PLN-694 2000) and the Quality Level 3 designation.

3. REMEDIAL DESIGN

3.1 Project Site

This section describes the remedial design for OU 5-12, which was developed in accordance with the engineering design criteria presented in Section 2. The civil design drawings and specifications for the action are included in Appendices A and B, respectively. The following sections summarize the major aspects critical to the remedial design.

3.2 Site Contaminant Summary

The following sections summarize the contamination at ARA-01 Chemical Evaporation Pond, ARA-12 Radioactive Waste Leach Pond, ARA-23 Radioactively Contaminated Soil and Subsurface Structures, and PBF-16 SPERT-II Leach Pond.

3.2.1 Auxiliary Reactor Area 01: Chemical Evaporation Pond

From 1970 to 1988, the pond received process discharges that contained small quantities of radioactive substances, acids, bases, and volatile organic compounds. Since 1988, the pond has been dry except during spring run-off and heavy precipitation. Based upon data collected during a 1982 sampling event, results of the ARA-01 baseline risk assessment (Stanisich et al. 1992), and additional sampling conducted as part of the WAG 5 RI/FS Work Plan (DOE-ID 1997), a risk assessment was performed. As a result of the site screening discussed in the WAG 5 RI/FS (Holdren et al. 1999), only selected metals and radionuclides were retained for further consideration in the baseline risk assessment. The human health risk assessment identified arsenic as a contaminant of concern (COC) based on human health risk estimates. In addition, the ecological risk assessment identified selenium and thallium as COCs based on hazard quotients for ecological receptors.

3.2.2 Auxiliary Reactor Area 12: Radioactive Waste Leach Pond

The Track 2 evaluation initiated in 1993 and completed in 1994 (Pickett et al. 1994) determined that a total risk of $2E-03$ was estimated for the 100-year future residential nonintrusion scenario, primarily because of direct exposure to Ag-108m, Cs-137, and U-238. As part of the WAG 5 RI/FS (DOE-ID 1997), a survey of the ARA-12 surface soil was conducted with the global positioning radiometric scanner (GPRS). Initially, the elevated gamma levels were attributed to Cs-137, but subsequent soil sample analyses showed Ag-108m to be the source (Giles 1999). The human health risk assessment identified Ag-108m as a COC for ARA-12 based on human health risk estimates. The ecological risk assessment determined that copper, mercury, and selenium were COCs based on hazard quotients for ecological receptors.

3.2.3 Auxiliary Reactor Area 23: Radiologically-Contaminated Soil and Subsurface Structures

A Track 1 investigation was initiated for ARA-23 in 1993, but was not finalized because the site was reassigned to OU 10-06 for evaluation. The OU 10-06 evaluation, which excluded the areas within the ARA-I and ARA-II facility fences, was only partially completed before ARA-23 was reassigned to WAG 5 for final disposition. The data gaps identified in the WAG 5 RI/FS Work Plan (DOE-ID 1997) comprised the horizontal and vertical extent of Cs-137 in the windblown soil area and the presence of other radionuclides such as Co-60, Eu-152, Eu-154, Sr-90, and uranium isotopes. Based on the sampling and analytical results, combined with the surface gamma-radiation survey conducted using the GPRS, a

risk assessment was performed. Cesium-137 was identified as the primary contributor to the estimated total risk for all pathways. The ARA-23 site was screened for evaluation in the ecological risk assessment because the only contaminants above background levels are radionuclides.

The original boundary for OU 5-05, ARA-06 Stationary Low Power Reactor No. 1 Burial Ground, was defined as the fence surrounding the SL-1 Burial Ground. However, the OU 5-05 ROD (DOE-ID 1996) redefined the operable unit boundary to include the northeast 40% of the windblown contamination area around ARA-I and ARA-II. Dose equivalent rate measurements outside the burial ground fence indicated radiological field levels at or below the average INEEL level of 20 $\mu\text{rem/hr}$ (Jorgensen 1995). Therefore, no unacceptable external exposure risks were identified for this area, and DOE-ID, EPA, and IDEQ reached consensus that no further action would be required for the surface soil outside the burial ground fence. However, this area was surveyed during the 1997 GPRS survey of ARA-I and ARA-II, and Cs-137 was detected at concentrations in excess of the remediation goal of 23 pCi/g identified for WAG 5 in the ROD (DOE-ID 2000a). Therefore, the surface soil in OU 5-05 exceeding the Cs-137 remediation goal will be remediated as part of Site ARA-23 during this remedial action.

3.2.4 Power Burst Facility 16: SPERT-II Leach Pond

The SPERT-II Leach Pond was sampled in 1982 for radionuclides and in 1983 for hazardous substances. The 1982 radionuclide sampling demonstrated that radioactivity levels were within background concentrations. As a result of the sampling event conducted in 1983, lead and mercury were detected in concentrations exceeding background values. Based on these two sampling events, the pond was screened from evaluation in the human health risk assessment (Holdren et al. 1999). The ecological risk assessment identified mercury as a COC for PBF-16. Refer to Section 5.1.2 for a discussion pertaining to consideration of the PBF-16 site for no further remedial action. This is a relevant change to the Scope of Work (SOW) (DOE-ID 2000b).

3.3 Site Preparation

Plot plans, delineating the lay-down areas, will be prepared before field activities commence. The following general site-preparation activities apply to all contaminated soil sites addressed in this work plan. Any special requirements are stated as noted on the design drawings.

- Fencing will be removed at the direction of radiological control (RadCon)
- The method for hauling soil to the ICDF will be demonstrated with clean soil and approved by the contractor
- Excavation boundaries will be established in accordance with Specification 01051–Construction Surveying and Staking, provided in Attachment 1
- Vegetation will be cleared in accordance with Specification 02200–Earthwork, provided in Attachment 1
- Decontamination areas will be established as directed by the contractor.

3.4 Earthwork

All earthwork involving excavation and backfill will be graded following backfill (not all areas will require backfill) to encourage drainage away from the excavation as per Specification 02200–Earthwork,

provided in Attachment 1. Those areas that are disturbed by earthwork activities will be revegetated as per the requirements set forth in Section 5.3.10. Standard dust control measures (e.g., water spray, stop work during high winds [sustained winds exceeding 25 miles per hour], soil fixatives) will be employed during all earthwork.

3.5 Surface Water

Contouring and grading of backfilled excavations (refer to Specification 02200 – Earthwork in Attachment 1) will be performed to maintain existing surface water flow patterns at each of the task sites. To note, not all excavations will require backfilling, but all areas will be contoured for drainage and revegetated or otherwise stabilized. Revegetation of the backfilled excavations (refer to Specification 02486 – Revegetation in Attachment 1) will be done to control the growth of noxious weeds.

3.6 Task-Site Staging

A lay-down area will be necessary at each site to stage equipment and materials close to the work. The staging areas will be located so that noncontaminated materials and equipment operate in work areas isolated from contaminated materials and equipment. A temporary decontamination area for personnel and equipment decontamination will be established at the control point for each area, in accordance with the decontamination requirements of the project HASP (INEEL 2003). Spill prevention and control will be maintained for the lay-down area. The lay-down area was selected based upon several factors. Meteorological data, of course, was considered to ensure the lay-down area would not be located in an area downwind from the prevalent wind direction at the task site. Among other considerations made in selecting the lay-down area were the proximity to the areas believed to require the greatest amount of excavation work, selection of clean areas based upon RadCon considerations, available infrastructure (i.e., power), and the topography of the site (e.g., undulating vs. flat). The combination of these criteria forms the basis for selection of the staging areas.

4. HUMAN HEALTH AND ENVIRONMENTAL COMPLIANCE

4.1 Remedial Action Objectives

The RAOs for OU 5-12 were developed in accordance with the National Contingency Plan (EPA 1990) and are based on the results of the human health and the ecological risk assessments as outlined in the ROD (DOE-ID 2000a). The intent of the RAOs is to set goals for the protection of human health and the environment.

Remediation objectives based on the unacceptable risks were developed for the contaminated soil sites. Human health risk in excess of $1\text{E-}04$ is determined primarily by external exposure to ionizing radiation. The radioactive contaminants of concern are Ag-108m and Cs-137. Dermal adsorption and ingestion of arsenic pose secondary human health risks. Ecological hazard quotients, greater than 10, are attributed to exposure to selenium, thallium, copper, and mercury in the soil.

The following land-use assumptions were used in the development of the RAOs for WAG 5 remediation:

- Institutional controls until 2095 will include current security controls, site access controls, radiological controls, and worker monitoring
- For 2095 and beyond, homes could be built anywhere within WAG 5 and a water-supply well could be drilled adjacent to the home.

The following RAOs were developed to protect human health and the environment for the contaminated soil sites:

- Inhibit direct exposure to radionuclide COCs that would result in a total excess cancer risk greater than or equal to 1 in 10,000 for current and future workers and future residents
- Inhibit dermal adsorption of COCs that would result in a total excess cancer risk greater than or equal to 1 in 10,000 or a hazard index of two or greater for current and future workers and future residents
- Inhibit ecological receptor exposures to contaminated soil with concentrations of contaminants greater than or equal to 10 times background values and that result in a hazard quotient greater than or equal to 10.

To meet these objectives, remediation goals were established. The remediation goals for the contaminants and estimated volumes for each of the contaminated soil sites are provided in Table 4-1. The remediation goals are at the upper end of the acceptable risk range because (1) conservative parameters were used in the risk assessment, (2) risk from background concentrations at the INEEL exceed $1\text{E-}06$, and (3) EPA radiation standards, which apply to risks from exposure to radionuclides, are generally set at a risk level of 1 in 10,000.

Remediation goals can be satisfied by either cleaning up to the identified contaminant concentration or by removing all soil down to the basalt interface. Removing soil down to basalt will be protective because surface exposure pathways will be eliminated; however, the potential risk associated with leaving contaminated basalt behind will need to be evaluated should that occur. If contamination in excess of risk-based levels remains in the basalt, then institutional controls will be required. The RI/FS for WAG 5 (Holdren et al. 1999) showed that groundwater exposure pathways pose a cumulative risk less than $1\text{E-}04$ and a hazard index less than one for the baseline no-action alternative. Removal of contaminated soil from WAG 5 will further reduce the potential groundwater risk.

Table 4-1. Remediation goals and soil volumes for Waste Area Group 5 contaminated soil sites.

Site	Contaminant of Concern	Remediation Goal	Soil Volume m ³ (ft ³)
ARA-01	Arsenic	10 mg/kg	1,821 (64,310)
	Selenium	2.2 mg/kg	
	Thallium	4.3 mg/kg	
ARA-12	Ag-108m	0.75 pCi/g	1,503 (53,933)
	Copper	220 mg/kg	
	Mercury	0.5 mg/kg	
	Selenium	2.2 mg/kg	
ARA-23	Cs-137	23 pCi/g	35,538 (1,255,000)
PBF-16	Mercury	0.5 mg/kg	382 (13,500)

4.2 Applicable or Relevant and Appropriate Requirements

Table 4-2 summarizes how the substantive requirements of the ARARs and the to-be-considered (TBC) requirements for the WAG 5 contaminated soil sites have been addressed by the remedial design or will be addressed during the remedial action. The substantive requirements of Resource Conservation and Recovery Act (RCRA) and IDAPA ARARs specific to hazardous waste will be met for those sites where RCRA-hazardous constituents may be present. These requirements are not applicable at those sites where the soil is not RCRA hazardous. Use of air monitoring and dust suppression techniques during excavation will ensure compliance with emissions ARARs. The site has been surveyed for cultural and archeological resources (see Attachment 8), and appropriate actions will be taken to satisfy ARARs for protection of sensitive resources. If cultural resources are encountered, the requirements delineated in the *INEEL Management Plan for Cultural Resources* (DOE-ID 2000d) will be involved. The DOE Order 5400.5 TBC requirements will be met through administrative and engineering controls to limit exposures to allowable levels.

Table 4-2. Compliance with ARARs and TBCs for the Waste Area Group 5 contaminated soil sites.

Category	Citation	Relevancy	Compliance Strategy
Action Specific ARARs			
<i>Rules for the Control of Air Pollution in Idaho</i>			
<ul style="list-style-type: none"> • Toxic Substances IDAPA 58.01.01.161 • Toxic Air Emissions IDAPA 58.01.01.585 and .586 	<p>The release of carcinogenic and noncarcinogenic contaminants into the air must be estimated before the start of construction, controlled, if necessary, and monitored during excavation and sorting of soil</p>	<p>A^a</p> <p>A</p>	<p>Releases of carcinogenic and noncarcinogenic contaminants into the air from the site are addressed in Appendix C. Air emissions will be monitored during excavation and dust suppression measures will be used.</p>
<p>Fugitive Dust IDAPA 58.01.01.650 and .651</p>	<p>Requires control of dust at all times, especially during excavation, sorting, and removal of soil</p>	<p>A</p>	<p>Dust suppression measures will be implemented, as necessary, during the remedial action to minimize the generation of fugitive dust. These measures may include water sprays, use of tarps, keeping vehicle speeds to a minimum, use of soil fixatives, and work controls during periods of high wind.</p>
<ul style="list-style-type: none"> • Requirements for Portable Equipment IDAPA 58.01.01.500.02 	<p>Portable equipment for sorting and removal of soil and any portable support equipment must be operated to meet state and federal air emissions rules</p>	<p>A</p>	<p>When used, portable equipment will comply with the appropriate INEEL Plans and internal company procedures, and will be in accordance with the project HASP (INEEL 2003).</p>
<i>National Emission Standards for Hazardous Air Pollutants</i>			
<ul style="list-style-type: none"> • Radionuclide Emissions from DOE Facilities 40 CFR 61.92 • Emission Monitoring 40 CFR 61.93 • Emission Compliance 40 CFR 61.94(a) 	<p>Limits exposure of radioactive contamination release to 10 mrem/year for the off-Site receptor and establishes monitoring and compliance requirements</p>	<p>A</p>	<p>Releases of radiological contaminants into the air from this site are addressed in Appendix C. Air emissions will be monitored during excavation and dust suppression measures will be used. Radionuclide emission calculations and air modeling are presented in Appendix C. The model resulted in an estimate of 2.54 E-03 mrem/year dose at the site boundary. The calculated emissions will be included in the INEEL's annual National Emission Standards for Hazardous Air Pollutants report, which determines the effective dose equivalent from the INEEL to members of the public.</p>

Table 4-2. (continued).

Category	Citation	Relevancy	Compliance Strategy
<i>Resource Conservation and Recovery Act—Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Units</i>			
<ul style="list-style-type: none"> General Waste Analysis IDAPA 58.01.05.008 [40 CFR 264.13 (a)(1-3)] 	Analysis requirements apply only to RCRA-hazardous soil and secondary waste generated during remediation	A	Sampling will be performed as per the Phase II FSP (DOE-ID 2003a) to determine if potentially RCRA-hazardous soil meets the land disposal restrictions (LDRs).
<ul style="list-style-type: none"> General Inspections IDAPA 58.01.05.008 (40 CFR 264.15) 	For soil sites determined to be RCRA hazardous, regular inspections must be performed during remediation	A	Inspections will be conducted, and the information obtained will be incorporated into the Annual Institutional Controls Status Report. Inspections will also be conducted as part of operations and maintenance activities. During remediation activities, inspections will be conducted on a weekly basis. Following completion of the remediation activities, inspections will be conducted according to the schedule outlined in the Operations and Maintenance Plan (DOE-ID 2000b).
<ul style="list-style-type: none"> Preparedness and Prevention IDAPA 58.01.05.008 (40 CFR 264, Subpart C) 	Applies to soil excavation, sorting, and decontamination activities at any site determined to be RCRA hazardous	A	Details as to how the emergency equipment will be maintained and arrangements with local authorities is outlined in the project HASP (INEEL 2003).
<ul style="list-style-type: none"> Contingency Plan and Emergency Procedures IDAPA 58.01.05.008 (40 CFR 264, Subpart D) 	Applies to soil excavation, sorting, and decontamination activities at any site determined to be RCRA hazardous	A	The project HASP (INEEL 2003) establishes an emergency response plan that documents the coordinated course of action to be followed in case of a fire, explosion, or release of hazardous waste or hazardous waste constituents that could threaten human health or the environment.
Equipment Decontamination IDAPA 58.01.05.008 (40 CFR 264.114)	All equipment used during remediation must be decontaminated if RCRA hazardous waste is contacted	A	Equipment decontamination will be conducted in accordance with the project HASP (INEEL 2003) waste management procedures outlined in the Phase II Work Plan, Appendix D, and the INEEL Pollution Prevention Program.
<ul style="list-style-type: none"> Use and Management of Containers IDAPA 58.01.05.008 (40 CFR 264.171-177) 	Applicable to RCRA-hazardous soil and associated hazardous secondary waste generated by remediation that is managed in containers	A	The waste management procedures outlined in the Phase II Work Plan, Appendix D ensure waste is compatible with the container and container integrity is maintained. Weekly inspections will be conducted by waste generator services. Secondary containment for all containers with free liquids will be provided at the CERCLA Waste Storage Units (PBF-ARA-1-CARGO-A). For all other containers, a storage area will be graded to provide run-off away from the containers.

Table 4-2. (continued).

Category	Citation	Relevancy	Compliance Strategy
<i>Resource Conservation and Recovery Act—Land Disposal Restrictions</i>			
<ul style="list-style-type: none"> Treatment Standards IDAPA 58.01.05.011 [40 CFR 268.40 (a)(b)(e)] 	Any RCRA-hazardous soil and associated hazardous waste must meet land disposal restriction criteria before disposal	A	Per the Phase II FSP (DOE-ID 2003a), potentially RCRA-hazardous soil will be analyzed per LDR requirements. Soil determined to exceed LDR requirements will be stabilized at the Staging, Storage, Sizing, and Treatment Facility (SSSTF), if necessary, to meet the ICDF's waste acceptance criteria.
<ul style="list-style-type: none"> Treatment Standards for Hazardous Debris IDAPA 58.01.05.011 [40 CFR 268.45 (a-d)] 		A	Per the Phase II FSP (DOE-ID 2003a), potentially RCRA-hazardous soil will be analyzed per LDR requirements. Soil determined to exceed LDR requirements will be stabilized at the SSSTF, if necessary, to meet the ICDF's waste acceptance criteria.
<ul style="list-style-type: none"> Universal Treatment Standards IDAPA 58.01.05.011 [40 CFR 268.48 (a)] 		A	Per the Phase II FSP (DOE-ID 2003a), potentially RCRA-hazardous soil will be analyzed per LDR requirements. Soil determined to exceed LDR requirements will be stabilized at the SSSTF, if necessary, to meet the ICDF's waste acceptance criteria.
<ul style="list-style-type: none"> Alternative Treatment Standards for Contaminated Soil IDAPA 58.01.05.011 [40 CFR 268.49] 		A	Per the Phase II FSP (DOE-ID 2003a), potentially RCRA-hazardous soil will be analyzed per LDR requirements. Soil determined to exceed LDR requirements will be stabilized at the SSSTF, if necessary, to meet the ICDF's waste acceptance criteria.
Location-Specific ARARs			
<i>National Historic Preservation Act</i>			
<ul style="list-style-type: none"> Historic properties owned or controlled by Federal agencies 16 USC 470 h-2 	The site must be surveyed for cultural and archeological resources before construction, and for appropriate actions taken to protect any sensitive resources	A	A cultural and archeological resource investigation was performed. Summaries of the results of the investigation are provided in Attachment 8. The investigation shows that there are cultural and/or archeological resources within this site. Employees involved in environmental restoration (ER) activities at WAG 5 will be trained in archaeological awareness. When cultural and/or archeological resources are encountered, measures will be taken to mitigate the effect that the ER activities have on those resources.
<ul style="list-style-type: none"> Identifying Historic Properties 36 CFR 800.4 			
<ul style="list-style-type: none"> Assessing Effects 36 CFR 800.5 			

Table 4-2. (continued).

Category	Citation	Relevancy	Compliance Strategy
<i>Native American Graves Protection and Repatriation Act</i>			
<ul style="list-style-type: none"> • Custody 25 USC 3002 (43 CFR 10.6) • Repatriation 25 USC 3005 (43 CFR 10.10) 	<p>The site must be surveyed for cultural and archeological resources before construction and for appropriate actions taken to protect any sensitive resources</p>	A	<p>A cultural and archeological resource investigation was performed. Summaries of the results of the investigation are provided in Attachment 8. The investigation shows that there are cultural and/or archeological resources within this site. Employees involved in ER activities at WAG 5 will be trained in archaeological awareness. When cultural and/or archeological resources are encountered, measures will be taken to mitigate the effect that the ER activities have on those resources.</p>
To-be-considered (TBC) guidance			
<i>Radiation Protection of the Public and the Environment</i>			
<ul style="list-style-type: none"> • DOE Order 5400.5 Chapter II (1)(a,b) 	<p>Limits the effective dose to the public from exposure to radiation sources and airborne releases</p>	^b —	<p>Will be met by administrative and engineering controls during excavation of contaminated soil and by backfilling and vegetating excavated areas, as necessary, after closure. Job Safety Analyses and/or Radiological Work Permits will be prepared for tasks where there is the potential for exposures to radioactive contamination/materials. Radiological work permits will only be used as determined by the radiological control technician, based on the INEEL Radiological Control Manual (Manual #15).</p>
<p>a. A = Applicable.</p> <p>b. TBCs are not classified as applicable or relevant and appropriate.</p>			

5. REMEDIAL ACTION WORK PLAN

The work plan details the management approach to the remedial action, including schedule and the necessary steps and documentation to perform the remedial action and document its completion. This section describes the elements necessary to implement the remedial design outlined in Sections 1 through 4. Because the remedial design and the remedial action work plan are combined into one document, some details of implementation have been described in the design portion of the document for clarity.

5.1 Relevant Changes to the Scope of Work

The following sections describe the relevant changes to the SOW (DOE-ID 2000c).

5.1.1 Auxiliary Reactor Area 25: ARA-I Soil beneath the ARA-626 Hot Cell

As discussed in Section 1, there was a distinct possibility that at least a portion, if not all, of the ARA-25 remedial action, may occur as part of the Phase I activities. This was attributed to the stainless steel piping associated with ARA-16 Radionuclide Tank remediation conducted under Phase I intersecting the concrete foundation walls and soil associated with the ARA-25 site. As part of the ARA-16 remedial action, the walls and soil associated with ARA-25 were disturbed. The extent of that disturbance was such that the remediation of ARA-25 was completed as part of the Phase I activities.

5.1.2 Power Burst Facilities 16: SPERT-II Leach Pond

The remediation of PBF-16 was included in the ROD (DOE-ID 2000a) because a single analytical result indicated the presence of mercury at levels that posed an unacceptable ecological risk. To gain a better understanding of the extent of the mercury contamination at the site, sampling was performed in June 2000 as per the requirements set forth in *Field Sampling Plan for the PBF-16 (SPERT-II) Leach Pond* (INEEL 2000). The results of this sampling (see Attachment 6) indicate that mercury concentrations are below the remediation goal of 0.5 mg/kg. Therefore, this site is no longer considered an unacceptable risk, and no additional remediation is required. The site will be evaluated for institutional controls in the final remedial action report for WAG 5.

5.1.3 Remediation Boundaries

Defining remediation boundaries at the various sites, especially ARA-23, is an iterative process. As more data are collected and the models are refined, these boundaries are, in turn, better defined. During the summer of 2002, the global-positioning radiometric scanner system was used to gather additional data that have been incorporated into the most recent models. The remediation boundaries shown in the design drawings provided in Appendix A were created by incorporating available data and processing that data using Terramodel by Spectra Precision Software. While, for the most part, the boundaries are similar to those provided in the ROD (DOE-ID 2000a) and the SOW (DOE-ID 2000c), there are some differences that will be apparent upon comparison of the drawings in Attachment 5 to corresponding figures in the two referenced documents.

In addition to the global-positioning radiometric scanner system data, the EG&G Ortec ISOCART system was used to determine the vertical distribution of the contamination at the ARA-23 site. Both the global-positioning radiometric scanner system and the ISOCART data are presented in Attachment 9.

5.2 Assumptions and Unresolved Issues

Sections 2 and 3 of the Scope of Work (DOE-ID 2000c) describe the assumptions and unresolved issues, respectively, associated with this project. Section 2.6 of this Work Plan describes the assumptions associated with the remedial design. Section 2.7 describes the unresolved issues associated with the remedial action.

5.3 Work Tasks

For the purposes of this Work Plan, “Contractor” refers to BBWI. “Subcontractor” means the business entity contracted to provide the materials, supplies, and/or services discussed herein. The following sections summarize the primary work tasks critical to completion of the activities specified in this Work Plan.

5.3.1 Premobilization

The BBWI construction management personnel assigned to this project will provide all required work plans. All Contractor and Subcontractor required training and current medical examinations and information required by the project HASP (INEEL 2003) will be provided before mobilizing to the task site.

5.3.2 Mobilization

Mobilization describes work that must be done in preparation for field operations. This work is generally the implementation of the required administrative, engineering, and health and safety controls including, but not limited to, the following:

- Fences, signs, and postings
- Identification and demarcation of task sites
- Delivery and storage of material and equipment
- Set-up of the field operations site offices
- Establish lay-down areas
- Establish decontamination areas.

5.3.3 Storm Water Management and Sediment Control

Storm Water Pollution Prevention requirements are not applicable in this area per the *INEEL Storm Water Pollution Prevention Plan for Construction Activities* (DOE-ID 1998). This determination is documented in the environmental checklist and accompanying letter provided in Appendix F.

5.3.4 Clearing and Mowing the Site

The task sites will be cleared of shrubs, vegetation, fences, and other debris as identified in the project drawings in Appendix A. Disturbance of underlying soil will be minimized during all clearing and mowing activities, which will be performed in accordance with Specification 02200–Earthwork, provided in Attachment 1 of this document. Because of the uptake of contamination, the vegetation will be mowed and left in place where it will be collected along with the excavated soil for disposal in the ICDF.

Clearing and mowing operations will be confined to the soil sites to be remediated, those areas required for barrier construction, or as directed by INEEL project personnel. Any areas outside the designated areas that are damaged or disturbed by field operations will be repaired and reseeded by the Subcontractor in accordance with Specification 02486–Revegetation, provided in Attachment 1 of this document.

5.3.5 Soil Excavation and Consolidation

Soil will be excavated and consolidated to the extent shown on the design drawings provided in Appendix A. Soil excavation will be limited to only that soil necessary to remediate each of the task sites. Excavated soil will be consolidated, as necessary, in a designated area immediately adjacent to the task site. All excavation and consolidation activities will be performed in accordance with Specification 02200–Earthwork, provided in Attachment 1 of this document.

Precautions such as water spray, wind monitoring, soil fixatives, and visual observation will be used to prevent the generation of fugitive dust. Air monitoring to assess the airborne spread of contamination will be performed in accordance with the project HASP (INEEL 2003). Additional air monitoring may be performed at the discretion of the radiological control technicians (RCTs) based on their evaluation of the effectiveness of dust suppression measures to control the spread of contamination through fugitive dust and as required by the Radiation Protection Manual (INEEL Manual #15). Air monitoring will be conducted as needed to ensure workers are protected from unnecessary radiological exposures and to keep any additional exposures as low as reasonably achievable. Likewise, the industrial hygienist may perform monitoring at those sites where the potential exists for exposure to chemical hazards. Personal protective equipment, when required, will be used as specified in the project HASP (INEEL 2003), and as determined by the RCT and/or the industrial hygienist present at the task site.

To minimize spread of contamination, equipment necessary for the excavation of soil will remain within the contamination control zones until completion of excavation activities. Following any excavation activities, the in situ field surveys using the global positioning radiometric scanner (GPRS) system will be performed only over those areas where actual excavation has taken place. If the surveys must proceed over potentially contaminated areas, the survey will proceed from the “clean” to “dirty” area to mitigate the spread of contamination back onto remediated soils. The vehicle will be surveyed by RadCon before leaving a contaminated area to ensure that no contamination is spread onto a previously remediated area.

5.3.6 Earthwork

The earthwork on this project will be defined as the following:

- Clearing vegetation as required
- Excavating all materials encountered, of every description, for completion of the project as shown in the drawings and as specified in Specification 02200–Earthwork, provided in Attachment 1
- Managing dust control
- Delivering all contaminated material excavated for completion of the project to an on-Site disposal facility
- Backfilling all excavations and reclaiming all disturbed task area support sites

- Compacting all backfill
- Finishing grading and grading for surface drainage or revegetation.

Earthwork at each of the task sites will include backfill with native soil from approved borrow sources on the INEEL. All earthwork will be performed in accordance with Specification 02200–Earthwork, provided in Attachment 1, and the project design drawings provided in Appendix A of this document.

5.3.7 Borrow, Haul, and Stockpile

Borrow materials that are required for this project are available from borrow sources located at the INEEL. All on-Site borrow sources have been previously determined to be free of contamination.

Borrow operations will be performed in accordance with project Specification 02200–Earthwork, provided in Attachment 1 of this document, and an approved INEEL Form 450.19. The Subcontractor will set up an operation at the borrow area to gather and stockpile the material in preparation for hauling it to the project site, and a hauling operation to move the material from the borrow source to the project site where it will be placed.

Equipment used for the haul and stockpile operations will remain outside contamination work areas. The work will require the services of heavy earthwork equipment such as scrapers, dozers, loaders, and large dump trucks, and will require up-front planning and coordination with other site operations and personnel to ensure safe and productive hauling across Site roads. The project will be responsible for maintaining the Site haul roads during operations and for returning haul roads to their original condition. If necessary, a traffic management plan will be prepared, including documentation of the condition of the haul roads before operations.

5.3.8 Dust Suppression

The Subcontractor will minimize dust generation during excavation, loading, hauling, and dumping by using water truck(s) and/or soil fixatives. Results of air monitoring, as required by the project HASP (INEEL 2003), will aid in determining whether the dust suppression methods are adequate. Over application of water resulting in free liquids will not be allowed because additional requirements would be imposed for handling liquid waste. A water-fill station is available at the Central Facilities Area (CFA) and fire hydrants are available at other facilities (i.e., PBF), provided an outage request is processed. Filling at a fire hydrant requires using an attaching gate valve and fire hose approved by the project manager and/or a designee to ensure compatibility.

Work will be restricted or suspended if unacceptable amounts of dust are being generated as determined by the field team leader (FTL), health and safety officer, and/or RCT. This dust may be a result of dry soil (which may require wetting down) or wind. All excavating, loading, hauling, and dumping operations will be suspended when sustained wind speed reaches 25 miles per hour (mph) or gusts of 30 mph or greater is reported by the INEEL National Oceanic and Atmospheric Administration weather station. The Subcontractor will anticipate several lost, partial, or full days because of high wind. Work areas that have the potential of generating dust will require spraying with a water truck at the end of each workday and other occasions as deemed necessary by the FTL, health and safety officer, and/or RCT.

5.3.9 Contaminated Soil Hauling

Contaminated soil will be hauled to the ICDF in either end dump trucks or roll-off containers with an anticipated capacity of 9.2 m³ (12 yd³) or greater. It is anticipated that any soil generated, ranging from 0.5 to 50 milli-roentgen equivalent man per hour (mrem/hr), may be shipped as unpackaged (bulk), low specific activity material to be transported in exclusive-use closed-transport vehicles. Soil with activities < 0.002 µCi/g and < 0.5 mrem/hr are not considered to be regulated for transportation as a hazardous material (49 CFR 173.403[y]). It is the intent of the project to ship only soil meeting this requirement. However, if soil exceeding this requirement (either through field screening, process knowledge, or analytical data) is to be shipped, the external radiation levels will be within the limits of 49 CFR 173.441(b). Radioactive placards will be placed on the front, on the back, and on each side, with no leakage of radioactive materials from the vehicle. These shipments will require shipping papers with exclusive-use instructions.

Hauling may occur concurrently from different locations provided the buddy system remains in effect and the crew is large enough to support it, as determined by the FTL, health and safety officer, and/or job-site supervisor. Each dump truck or roll-off container will have a locking tailgate with a gasket, or some other mechanism to prevent loss of soil during transport. The driver will inspect the tailgate before and after loading to ensure it is properly latched. The dump truck or roll-off will have a new plastic liner installed for each load to mitigate contamination and provide a means of dust control during transportation and disposal at the ICDF. Loads will be covered with a tight fitting tarp to prevent loss of material during transport. The cover will be evaluated and approved by the RCT and environmental personnel before initial use and throughout the duration of the transfer process.

After loading and before leaving the area, the driver will visually inspect each truck and/or roll-off, and the RCT will perform a radiological survey to ensure the exterior is not contaminated. This survey may take up to 15 minutes per load. If soil radiation levels are high enough to preclude direct frisking, the RCT will be required to take swipes, which must be counted. In this case, the survey may take over an hour. Before leaving the area and under the direction of the contractor, the Subcontractor will be responsible for removing any discovered external contamination. After the load has been dumped, trucks/roll-offs will be covered with a tarp for the return trip. Before leaving the ICDF, the trucks and/or roll-offs will be radiologically surveyed to again ensure the exterior is not contaminated. To mitigate the potential spread of contamination, trucks and/or roll-offs will be restricted to areas that have been surveyed clean. If roll-offs are used, trucks will be dedicated to specific functions (i.e., loading at the remediation site, transport between the remediation site and ICDF, and unloading at the ICDF).

5.3.10 Reclamation Seeding

Upon completion of all earthwork activities, reclamation seeding will take place on the native soil covers, the areas adjacent to the barriers that have been disturbed during construction, lay-down areas, and all areas affected by remediation activities, such as material borrowing and stockpiling. The seeding and mulching of these sites will be performed in accordance with the requirements set forth in Specification 02486–Revegetation, provided in Attachment 1 of this document.

5.3.11 Demobilization

After the remedial action activities have been satisfactorily completed, and all the equipment has been properly decontaminated, task personnel will demobilize, and the equipment will be removed from the site. Decontamination pads and temporary fencing erected in support of the activities described in this work plan will be removed and packaged or disposed appropriately.

5.4 Summary of Site Activities

The design drawings in Appendix A and the specifications in Attachment 1 outline the details of the work to be conducted in support of the WAG 5 remedial action. The Subcontractor will be responsible for surveying each site (refer to Specification 01051–Construction Surveying and Staking in Attachment 1) to establish the excavation boundaries under the direction of the Contractor. Clearing and mowing, excavating, backfilling of excavations, compacting of backfill, and finish grading will be conducted as per the requirements set forth in Specification 02200–Earthwork in Attachment 1. The excavating activities will commence along the southwest corner of each remedial action site and proceed in a northeasterly direction to mitigate the windblown spread of contamination over areas that have already been remediated. Where contaminated soil extends to the soil/basalt interface, the Subcontractor shall remove the contaminated soil to the extent practical from the basalt interface and in the basalt cracks and crevices using methods that include sweeping with brooms and/or vacuuming. Following confirmation that the remedial action objectives have been achieved for a given site, the site will be revegetated as per the requirements set forth in Specification 02486–Revegetation in Attachment 1. The following subsections summarize the field activities that will take place at each of the individual contaminated soil sites.

5.4.1 Auxiliary Reactor Area 01: ARA-I Chemical Evaporation Pond

For ARA-01, arsenic, selenium, and thallium are the COCs requiring the site to be remediated. Soil from within the defined remediation boundaries will be excavated in 7.6 cm (3 in.) lifts using conventional excavation equipment (e.g., motor graders, loaders) followed by shovel work if directed by the BBWI project engineer or designee. The excavated soil will be loaded directly into end dump trucks or roll-offs for transport to the ICDF for disposal. In accordance with the ARARs, appropriate dust suppression techniques will be implemented during the remedial action to minimize the generation of fugitive dust and to mitigate the exposure of personnel and off-Site receptors to airborne radioactive contamination. The trucks and/or roll-offs will be surveyed as outlined in Section 5.3.9.

Sampling of the site using analytical screening techniques will be performed following each 7.6 cm (3 in.) lift to determine whether the remedial action goals have been met. If additional excavation is determined to be necessary, the screening data will be used to revise the remediation boundaries. Excavation, screening, and revising of the boundaries will continue until either the remedial action goals have been achieved or basalt is reached. At this point, confirmation sampling will occur as outlined in the project FSP (DOE-ID 2003a) for final determination as to whether the goals have been achieved. Based on the results of the confirmation sampling either excavation (mechanical or hand) may continue, or the excavation will be backfilled, compacted, and finish graded, followed by revegetation.

5.4.2 Auxiliary Reactor Area 12: ARA-III Radioactive Waste Leach Pond

For ARA-12, Ag-108m, copper, mercury, and selenium are the COCs driving the site to be remediated. The remedial action will follow the same approach as that for ARA-01. An exception is the presence and handling of a radiation controlled area fence (refer to Drawing C-8 in Appendix A). This fence lies within the boundary of the area to be remediated. As such, this fence will be removed under the direction of RadCon personnel before the commencement of remedial activities at the site. Following completion of the remedial action, the fence may be rebuilt depending on the results of the confirmation sampling and RadCon site survey. Screening, confirmation sampling, backfilling, grading, and revegetating will follow suit as described for ARA-01. In accordance with Drawing 516013, provided in Appendix A, special care will need to be taken to protect the juniper trees that are present in the northeast end of the pond. Hand digging may be required to remove the contaminated soil around the trees.

5.4.3 Auxiliary Reactor Area 23: Radiologically Contaminated Surface Soil and Subsurface Structures Associated with ARA-I and ARA-II

For ARA-23, Cs-137 is the only COC requiring remediation. For remediation, the site has been divided into five sub-areas based upon the depositional mode of the contamination. Those areas are as follows:

- Hot spots in the SL-1 Burial Ground
- Haul road leading to the SL-1 Burial Ground
- ARA-I and ARA-II facilities
- Soil areas A and C
- All other areas within ARA-23.

For the hot spots in the SL-1 Burial Ground, the exact depositional mode of the contamination is unknown, but is believed to be an artifact of the SL-1 cleanup activities conducted in 1961. The remedial action will follow the same approach as that for ARA-01 with the exception that initially the excavation will be conducted in 15.2 cm (6 in.) lifts rather than 7.6 cm (3 in.). As the excavation progresses, lifts will be performed in 7.6 cm (3 in.) increments to minimize the quantity of soil to be disposed. Because the excavation area is relatively small, diligence must be maintained to ensure the existing covers at SL-1 are not disturbed and that waste within the trenches at SL-1 is not encountered. More specialized excavation techniques and extensive hand digging may be employed. Screening, confirmation sampling, backfilling, grading, and revegetating will follow suit as described for ARA-01.

For the haul road leading to the SL-1 Burial Ground, the contamination was deposited as a result of transporting and dragging contaminated materials from the SL-1 accident site to the burial trenches. Again, the remedial action approach will be identical to that for the ARA-01, with one exception: initially, 15.2-cm (6-in.) lifts will be employed rather than 7.6 cm (3 in.) lifts. As the excavation progresses, lifts will be performed in either 7.6-cm (3-in.) or 15.2-cm (6-in.) increments, depending on the field determination as to how much additional contaminated soil remains before the underlying contaminated soil is reached. Screening, confirmation sampling, backfilling, grading, and revegetating will follow suit as described for ARA-01.

The soil contamination at the ARA-I and ARA-II facilities is a result of the SL-1 incident with the primary mode of contamination being windblown deposition. Various radiation-controlled area fencing will either need to be removed or temporarily opened to allow for movement of excavation and hauling equipment. Depending on the results of the confirmation sampling and RadCon surveys, these fences may or may not be replaced. Within the ARA-I facility area, the exact excavation boundaries are yet to be defined, because the proximity of sludge waste from the ARA-16 Radionuclide Tank that is being stored at the site is affecting the background levels, making accurate definition of the boundaries difficult. Once the waste is moved, allowing determination of the excavation boundaries, the initial lifts within the ARA-I facility area will be 7.6 cm (6 in.). Within the ARA-II facility, the initial lifts will be 15.2 cm (6 in.) based upon the data presented in Attachment 9. Screening, confirmation sampling, backfilling, grading, and revegetating will follow suit as described for ARA-01.

For soil areas A and C (refer to Drawings C-6 and C-4, respectively, in Appendix A), the original source for the contamination was windblown deposition. The soil itself was actually stockpiled during the segmented gate system treatability study conducted in 1999. The soil was excavated using 7.6-cm (3-in.)

lifts, with the stockpiles requiring disposal with the other ARA-23 excavated soil. The soil underlying the stockpiles may require additional excavation based upon the results of field screening following removal of the stockpiles. The excavation of this soil will follow the same approach as that for all other areas in ARA-23 as discussed in the following paragraph.

For the other areas within ARA-23 not specifically mentioned above, the depositional mode is varied including windblown, vehicle decontamination, and dismantlement of the SL-1 reactor facilities. The remediation of these areas will follow the same approach as that for ARA-01 with soil excavation proceeding in 7.6 cm (3 in.) or less lifts. Two areas that deserve special consideration include the asphalt within the ARA-I and ARA-II facility areas and the lava rock rubble area located north-northeast of the ARA-I facility. In accordance with Specification 02200—Earthwork provided in Attachment 1, the asphalt and rocks will be removed and disposed along with the contaminated soil at the ICDF. Screening, confirmation sampling, backfilling, grading, and revegetating will follow suit as described for ARA-01. The Subcontractor is encouraged to minimize the depth of excavation in an effort to minimize volume.

5.5 Field Oversight

The DOE-ID remediation project manager will be responsible for notifying the EPA and the IDEQ about project activities. The project manager will also serve as the single interface point for all routine contact between the Agencies and BBWI.

In addition, BBWI will provide field support services for field oversight, health and safety, environmental, quality assurance, and landlord services for this project. An organization chart and position description is provided in the project HASP (INEEL 2003).

5.5.1 Protocol and Coordination of Field Oversight

The DOE will notify the EPA and IDEQ WAG managers of pending remedial action activities, such as project start-up, closeout and inspections. Activities related to preliminary inspections, the prefinal inspection, and the final inspection are covered in Section 5.8. In accordance with the FFA/CO (DOE-ID 1991), notification will be provided to the EPA and IDEQ WAG managers a minimum of 14 calendar-days before prefinal inspection activities.

Visitors to any of the project sites who wish to observe activities must meet badging and training requirements necessary to enter INEEL facilities. Training requirements for visitors are described in the project HASP (INEEL 2003).

5.6 Project Cost Estimate

The project cost estimates for the tasks addressed by the Phase II Work Plan are presented in Appendix E. The costs may be revised during subsequent submittals of this document to reflect the most current estimate, based on comments to the design and other data.

5.7 Project Schedule

The schedule for Phase II of the WAG 5 RD/RA is presented in Figure 5-1, with the associated data identified in Table 5-1. The schedule covers all Phase II project tasks identified in the WAG 5 RD/RA SOW (DOE-ID 2000c) through completion of the remedial action report. The schedule also includes activities associated with the revision of the Phase II Work Plan and associated documentation. Administrative and document preparation activities are based upon an 8-hour day, 5-day work week,

while field activities are based upon a 10-hour day, 4-day work week. The schedule does not allow for possible delays caused by late or slow document reviews, or for field activities hindered by adverse weather conditions or other circumstances outside the control of the project team. The schedule assumes the ICDF will begin accepting WAG 5 soil on July 15, 2003.

5.8 Inspections

Upon completion of remedial action construction activities, standard prefinal and final inspections will be performed at each site at the discretion of the project managers or designees. Periodic inspections can occur at any time during remedial activities. The inspections will be conducted to finalize all project work elements. The inspections will establish compliance with the remedial design, the remedial action work plan, and with all requirements indicated.

5.8.1 Prefinal Inspection

The Agency project managers or their designees will conduct the prefinal inspection before completion of the remediation. Approximately two weeks before the prefinal inspection date, the DOE-ID will notify the Agencies. This inspection will determine the status of remediation activities, including outstanding requirements and actions necessary to resolve any issues identified. All of the outstanding requirements, along with the actions required to resolve them, will be identified and approved by the Agencies during the inspection. The prefinal inspection report will document any unresolved items and the actions required for resolution. In some instances, the prefinal inspections can be performed as each major element of the project is completed, rather than at the time of total completion.

A checklist used to document the prefinal inspection will be developed and will be implemented upon approval by the Agencies. The action for resolution and the anticipated schedule of completion will be noted next to the outstanding items and documented on the prefinal inspection checklist.

Table 5-1. Start, completion, and enforceable dates for Phase II of the WAG 5 Remedial Design Remedial Action.

Activity	Document Type	Start Date	Scheduled Completion Date	Enforceable Date
Draft RD/RA SOW sent to Agencies for review	NA	2/28/00	3/29/00	
RD/RA SOW finalized	NA	3/29/00	4/13/00	
Phase II RD/RA preliminary design (i.e., table top) review	NA	7/25/00	7/26/00	
Draft Phase II RD/RA Work Plan sent to Agencies	Primary	9/11/00	9/11/00	10/11/00
Agency review of the Draft Phase II RD/RA Work Plan	NA	9/11/00	10/26/00	
Agency comments on Phase II RD/RA Work Plan due	NA	10/26/00	10/26/00	
Resolution of Phase II RD/RA Work Plan comments	NA	10/26/00	11/9/00	
Draft final Phase II RD/RA Work Plan sent to Agencies	NA	11/9/00	12/11/00	
Phase II RD/RA Work Plan finalized	NA	12/18/00	12/18/00	

Table 5-1. (continued).

Activity	Document Type	Start Date	Scheduled Completion Date	Enforceable Date
Revised Phase II RD/RA Work Plan sent to Agencies	Primary	1/8/03	1/8/03	
Agency review of the revised Phase II RD/RA Work Plan	NA	1/9/03	2/9/03	
Agency comments on the revised Phase II RD/RA Work Plan due	NA	2/9/03	2/9/03	
Resolution of the revised Phase II RD/RA Work Plan comments	NA	2/10/03	2/21/03	
Draft final of the revised Phase II RD/RA Work Plan sent to the Agencies	NA	2/21/03	3/23/03	
Revised Phase II RD/RA Work Plan finalized	NA	3/23/03	3/23/03	
Phase II mobilization to WAG 5	NA	7/1/03	7/14/03	
Phase II field work	NA	7/15/03	9/30/04	
Phase II prefinal inspection	NA	8/17/04	8/18/04	
Prefinal inspection report for Phase II preparation and internal review	NA	8/18/04	9/29/04	
Prefinal inspection report for Phase II submitted	NA	9/30/04	9/30/04	
Draft remedial action report submitted to Agencies documenting all remedial actions taken at WAG 5	Primary	1/31/05	1/31/05	1/31/06
Five-year review conducted	NA	6/22/05	6/22/05	
<u>Draft operations and maintenance</u> report submitted	Primary	2/28/05	2/28/05	2/28/06
a. The tabletop review fulfills the requirements of the secondary preliminary design document.				

5.8.2 Prefinal Inspection Report

Documentation of the prefinal inspection will be provided in a prefinal inspection report that will contain the following elements:

- The names of all inspection participants
- The inspection checklist(s) containing specific project systems, components, start-up procedures, or other areas to be inspected to constitute acceptance of remediation activities
- A discussion of all documented inspection findings
- Corrective actions to be taken to correct deficiencies identified in the inspections, including the required corrective action, acceptance criteria or standards, and planned dates for completion of the actions
- A date for the final inspection.

This report will be issued to indicate the objectives of the ROD (DOE-ID 2000a) are being met and remedial actions' facility operations may commence. The prefinal inspection report will not be revised/finalized. The inspection will be finalized in the remedial action report documenting the prefinal

inspection process. The completed prefinal inspection checklist may be included as an appendix to the remedial action report in accordance with Section 8.4 of the FFA/CO (DOE-ID 1991). Submittal of the prefinal inspection report and the respective targeted schedule are identified in Section 5.6.

5.8.3 Final Inspection

The final inspection will be conducted following demobilization, after all excess materials and nonessential construction equipment have been removed from the sites, and remediation of the sites is considered complete. Some equipment may remain onsite to repair items identified during final inspections. Final inspections, as conducted by the Agencies' project managers or their designees, will confirm the resolution of all outstanding items identified in the prefinal inspection and verify that the OU 5-12 remedial action has been completed according to the requirements of the ROD (DOE-ID 2000a). Final inspections will be documented in the remedial action report.

5.9 Remedial Action Sampling and Analysis Plan

The sampling and analysis plan (SAP) for Phase II of the INEEL WAG 5 RD/RA project is comprised of two parts:

- FSP
- QAPjP.

These plans have been prepared pursuant to the *National Oil and Hazardous Substances Contingency Plan* (EPA 1990), consistent with the EPA on the preparation of SAPs, and in accordance with internal company procedures. The FSP, *Field Sampling Plan for the Waste Area Group 5 Remedial Action – Phase II* (DOE-ID 2003a), describes the field sampling activities that will be performed, while the QAPjP details the processes and programs that will be used to ensure the data generated are suitable for their intended purposes. The governing QAPjP for this sampling effort will be the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10 and Inactive Sites* (DOE-ID 2002b). The QAPjP (DOE-ID 2002b) is incorporated into the FSP (DOE-ID 2003a) by reference. Work control processes will follow formal practices as per communicated agreement with the appropriate site area directors and the environmental restoration (ER) project manager.

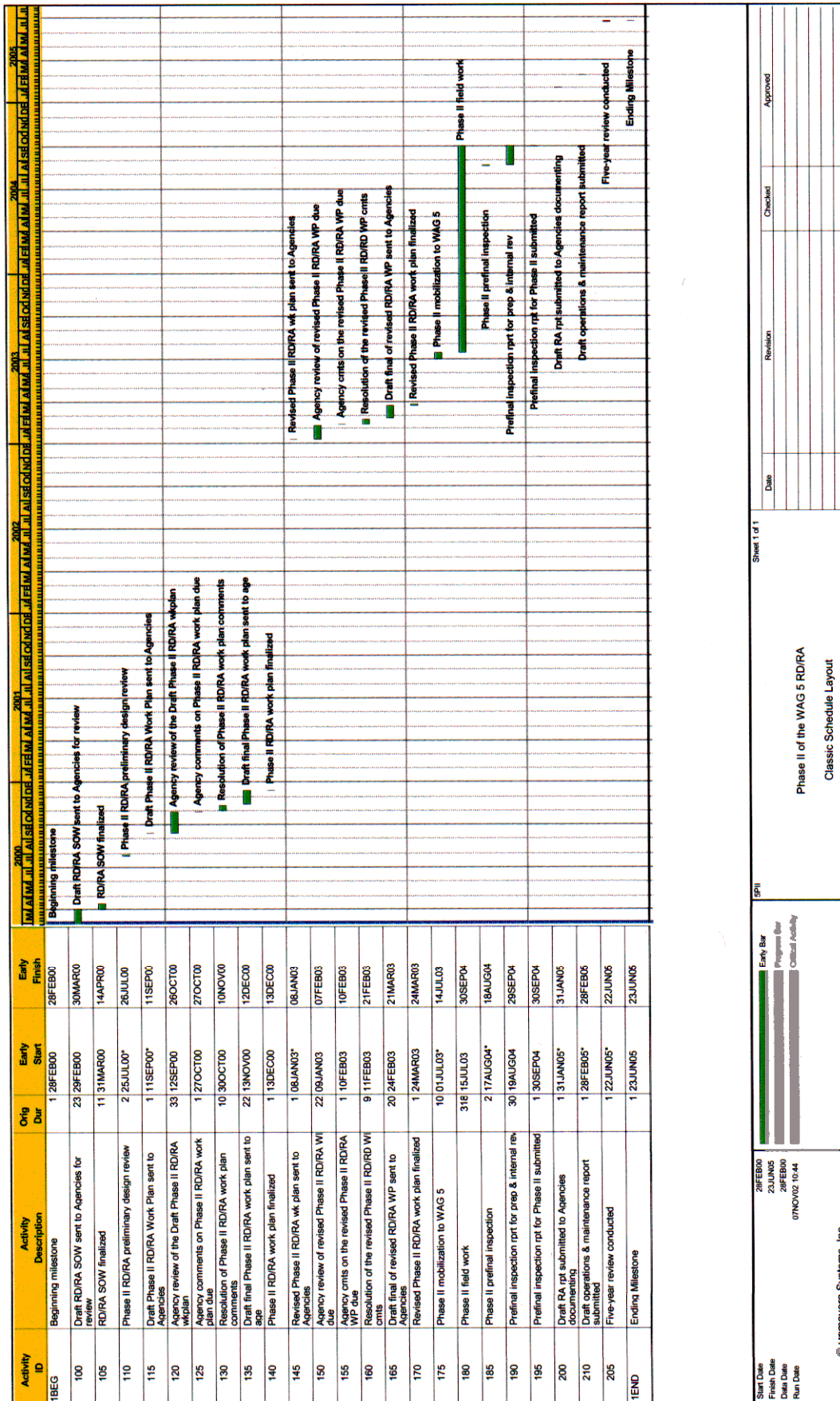


Figure 5-1. Project schedule.

5.10 Health and Safety Plan

A site-specific HASP (INEEL 2003) has been prepared specifically for the tasks and conditions to be encountered on this project. This document is a living document and may be updated as conditions dictate. The plan covers the following items:

- Task-site responsibility
- Personnel training
- Occupational medical program and medical surveillance
- Accident Prevention Program
- Site control and security
- Hazard evaluation
- Personal protective equipment
- Decontamination
- Emergency response plan for the task sites.

5.11 Waste Minimization Plan

Waste will be generated as a result of the activities conducted during this project. Waste expected to be generated includes, but is not limited to, the following:

- Personal protective equipment
- Equipment decontamination liquid residue
- Equipment decontamination solid residue
- Plastic sheeting
- Fencing materials
- Excavated, contaminated soil
- Removed vegetation to be disposed with the excavated contaminated soils
- Air monitoring filters
- Unused/unaltered sample material
- Analytical residues
- Sample containers
- Hydraulic spills
- Miscellaneous waste.

Waste may be hazardous. As remediation continues, additional waste streams may be identified. All new waste streams projected, as well as those identified above, are required to have the waste identified and characterized. A hazardous waste determination must be completed and presented to the appropriate waste management organization (e.g., Waste Generator Services) for approval by that organization at the time of generation. A complete description of the waste being generated and the appropriate disposition route is provided in Appendix D, Waste Management.

5.12 Decontamination Plan

Equipment decontamination will be conducted at each site where contaminated materials will be encountered. Decontamination areas will be established in areas such that the potential for downwind contamination from the remediation sites is mitigated. Decontamination operations will be performed in accordance with the requirements set forth in the project HASP (INEEL 2003).

Dry decontamination procedures will be used at the beginning of the decontamination effort. If these procedures are not successful, the equipment will be moved onto a clean, decontamination pad or plastic and sprayed with a high-pressure water spray from a portable unit. Then all equipment will be surveyed and visually inspected to ensure all source contamination has been removed. If additional contamination is evident, further decontamination efforts will be conducted until the equipment is clean and may be released. The equipment will remain in the area where remediation is occurring until it is adequately decontaminated, as verified by a field radiation survey performed by the RCT and/or field surveillance conducted by the industrial hygienist. The following equipment is required for decontamination:

- Decontamination pads or plastic large enough for any equipment used in the contaminated areas
- Brooms, wire brushes, putty knives, and other small tools for removing contamination through dry methods
- Portable low-volume, high-pressure water spray units (this equipment would only be used if dry decontamination was ineffective).

Management of waste generated during decontamination efforts will remain within the area of contamination for temporary storage until final waste disposition. Tools used for equipment decontamination (e.g., brushes) will be decontaminated, surveyed for contamination, and released for reuse.

5.13 Spill Prevention/Response Program

Any inadvertent spill or release of potentially hazardous materials will be subject to the substantive requirements contained in the *INEEL Emergency Plan/RCRA Contingency Plan* (PLN-114) for the CFA area. To note, ARA is covered under the CFA addendum to the plan, with PBF being covered under its own addendum. Handling of the materials and/or substance will be in accordance with the recommendations of the applicable material safety data sheets, which will be located onsite. In the event of a spill, the emergency response plan (see Section 11 of the project HASP [INEEL 2003]) will be activated. All materials/substances on the work site will be stored in accordance with the applicable regulations and in approved containers.

5.14 Groundwater Monitoring

Because of the long-term nature associated with groundwater monitoring, a separate plan has been prepared outlining the necessary activities. The groundwater-monitoring plan for the INEEL WAG 5 RD/RA project, like the remedial action SAP, is comprised of a FSP and a QAPjP. These plans have been prepared pursuant to the *National Oil and Hazardous Substances Contingency Plan* (EPA 1990), consistent with the EPA on the preparation of SAPs, and in accordance with internal company procedures. The *Groundwater Monitoring Plan for the Waste Area Group 5 Remedial Action* (DOE-ID 2003b), describes the field sampling that will be performed, while the QAPjP (DOE-ID 2002b) details the processes and programs that will be used to ensure the data generated are suitable for their intended purposes. The governing QAPjP for this sampling will be the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10 and Inactive Sites* (DOE-ID 2002b). The QAPjP (DOE-ID 2002b) is incorporated into the groundwater-monitoring plan by reference. Work control processes will follow formal practices as per communicated agreement with the appropriate site area directors and the ER manager of projects.

5.15 Operations and Maintenance Plan

The operations and maintenance plan (DOE-ID 2000b) describes the long-term operations and maintenance activities that will be conducted at WAG 5, OU 5-12 to ensure the selected remedies identified in the ROD (DOE-ID 2000a) remain protective of human health and the environment. The plan outlines the ongoing maintenance activities and inspection requirements for the reseeded areas. In addition, the environmental monitoring requirements for WAG 5 are described. The plan is a living document, revised as necessary to incorporate changes and additions identified during the implementation of the plan. If contamination exceeding the allowable concentrations for free release remains following all efforts to remediate a site, the site will be considered for institutional controls. This will be documented in the final remedial action report.

The institutional control plan is included as an appendix to the operations and maintenance plan (DOE-ID 2000b) and outlines the institutional control requirements for WAG 5. The plan describes those items that will be included in the annual inspections. The extent of institutional controls ranges from restricting the site to industrial land use until 2095 with the option to discontinue restrictions sooner based on the results of a 5-year review to controlling land use while augmenting the existing institutional controls with signs and maintenance of an existing cover. The plan is a living document, revised as necessary to incorporate changes and additions identified during the implementation of the plan and subsequent 5-year reviews. Table 5-2 summarizes the sites and corresponding recommended institutional controls. As per the Phase I Remedial Action Report (DOE-ID 2002a), the ARA-07 and ARA-08 sites have been added to the list as requiring institutional controls until such time as it is determined during a 5-year review that such controls are no longer necessary.

5.16 Remedial Action Report

The Phase II remedial action report will be prepared following demobilization and restoration of the sites, and submitted to the agencies as a primary document. The remedial action report will include but not be limited to the following:

- Identification of the work defined in the RD/RA Phase II Work Plan and certification that the work was performed.
- Explanation of any modifications to the RD/RA Phase II Work Plan.

Table 5-2. Recommended institutional controls.

Site Code	Site Name	Recommendation
ARA-01	ARA-I Chemical Evaporation Pond	Restrict the site to industrial land use until remediation is implemented as prescribed in the ROD (DOE-ID 2000a); then reevaluate requirements. Land-use controls will not be required after remediation if all contaminated soil is removed to basalt or if contaminant concentrations are comparable to local background values. Otherwise, institutional controls will be maintained until discontinued, based on the results of a 5-year review.
ARA-02	ARA-I Sanitary Waste System	Remediation of the site has been completed. Institutional controls will be maintained until discontinued, based on the results of a 5-year review.
ARA-03	ARA-I Lead Sheeting Pad near ARA-627	Restrict the site to industrial land use until discontinued based on the results of a 5-year review.
ARA-06	ARA-II Stationary Low-Power Reactor No. 1 Burial Ground	Maintain land-use controls to inhibit intrusion into the buried waste. Surface contamination will be addressed by the remediation of ARA-23. Institutional controls will be maintained until discontinued based on the results of a 5-year review. Recommendations for appropriate land-use restrictions will accompany any land transfer.
ARA-07	ARA-II Seepage Pit to the East (ARA-720A)	Restrict the site to industrial land use until discontinued, based on the results of a 5-year review.
ARA-08	ARA-II Seepage Pit to the West (ARA-720B)	Restrict the site to industrial land use until discontinued, based on the results of a 5-year review.
ARA-12	ARA-III Radioactive Waste Leach Pond	Restrict the site to industrial land use until remediation is implemented as prescribed in the ROD (DOE-ID 2000a); then reevaluate requirements. Land-use controls will not be required after remediation if all contaminated soil is removed to basalt or if contaminant concentrations are comparable to local background values. Otherwise, institutional controls will be maintained until discontinued, based on the results of a five-year review.
ARA-16	ARA-I Radionuclide Tank	Remediation of the site has been completed. Institutional controls will be maintained until discontinued, based on the results of a 5-year review.
ARA-23	ARA-II Radiologically-Contaminated Surface Soil and Subsurface Structures Around ARA-I and ARA-II	Restrict the site to industrial land use until remediation is implemented as prescribed in the ROD (DOE-ID 2000a); then reevaluate requirements. Land-use controls will not be required after remediation if all contaminated soil is removed to basalt or if contaminant concentrations are comparable to local background values. Otherwise, institutional controls will be maintained until discontinued, based on the results of a 5-year review.
ARA-24	ARA-III Windblown Soil	Land use will be restricted to prohibit potential exposure to radiologically contaminated material. Institutional controls will be maintained until discontinued based on the results of a five-year review. Recommendations for appropriate land-use restrictions will accompany any land transfer.

Table 5-2. (continued).

Site Code	Site Name	Recommendation
ARA-25	ARA-I Soil Beneath the ARA-626 Hot Cells	Remediation of the site has been completed. Because of the presence of residual contamination remaining at the site, institutional controls will be maintained until discontinued, based on the results of a 5-year review.
PBF-10	PBF Reactor Area Evaporation Pond (PBF-733)	Restrict the site to industrial land use until discontinued, based on the results of a 5-year review.
PBF-12	PBF SPERT-I Leach Pond	Restrict the site to industrial land use until discontinued based on the results of a 5-year review.
PBF-13	PBF Reactor Area Rubble Pit	Control land use to prohibit potential exposure to friable asbestos. Augment the existing institutional controls with signs and maintenance of the existing cover. Periodic inspections are defined in the WAG 5 institutional control plan (DOE-ID 2000b). Institutional controls will be maintained until discontinued, based on the results of a 5-year review. Recommendations for appropriate land-use restrictions will accompany any land transfer.
PBF-21	PBF SPERT-III Large Leach Pond	Restrict the site to industrial land use until discontinued, based on the results of a 5-year review.
PBF-22	PBF SPERT-IV Leach Pond (PBF-758)	Restrict the site to industrial land use until discontinued, based on the results of a 5-year review.
PBF-26	PBF SPERT-IV Lake	Restrict the site to industrial land use until discontinued, based on the results of a 5-year review.

- Any modifications made to the remedial design during the remedial action phase, including the purpose and results of the modifications.
- Problems encountered during the remedial action and resolutions to these problems.
- Any outstanding items from the prefinal inspection report that were identified and described. In responding to comments received, the prefinal inspection report will not be revised, but rather will be finalized in the context of the remedial action report.
- Certification that the remedies are operational and functional. DOE-ID will provide a statement certifying that the remedies are achieving, or have achieved, the requirements of the ROD (DOE-ID 2000a) As-built drawings showing final contours.
- Final total costs of the remedial action for Phase II of the remedial action.
- Results of the Phase II Final Inspection(s). Any final inspection will be documented in the draft remedial action report, submitted to the Agencies' project managers within 60 calendar days of the final inspection, and used to resolve prefinal inspection issues.

In addition, the remedial action report will summarize the activities from the Phase I remedial actions to close out the entire WAG 5 RD/RA.

6. FIVE YEAR REVIEW

In accordance with the National Contingency Plan (EPA 1990), a review of the selected remedy will be conducted no less than every 5 years for sites where contamination above risk-based concentrations is left in place. The 5-year review will evaluate the remedy to determine if it protects human health and the environment. Five-year reviews will be conducted for remediated sites with institutional controls at least until 2095 (i.e., until the 100-year institutional control period expires) or until it is determined during a 5-year review that controls and reviews are no longer necessary.

Land use will be restricted at the ARA-01 Chemical Evaporation Pond, ARA-12 Radioactive Waste Leach Pond, and the ARA-23 Radiologically-Contaminated Surface Soil around ARA-I and ARA-II until remediation is implemented as prescribed in the ROD (DOE-ID 2000a). Land-use controls will not be required after remediation if all contaminated soil and/or sludge is removed to basalt or if contaminant concentrations are comparable to local background values. These sites will also be subject to 5-year reviews with restrictions remaining until 2095 or until determined to be unnecessary during the 5-year review cycles. Operations and maintenance of the institutional controls will include but not be limited to the following:

- An annual walk-through inspection to determine the condition of the implemented institutional controls (e.g., signs, postings, markers, and fencing)
- Administrative controls will be continued, including deed restrictions, access restrictions, and ensuring completion of the proper notifications as per the *INEEL Comprehensive Facility and Land Use Plan* (DOE-ID 2001)
- Reseeded areas will be inspected annually for the first three years
- The native-soil covers will be inspected annually to determine soil cover integrity, and radiologically surveyed to ensure contamination levels are stable or decreasing due to half-life.

An Institutional Controls Status Report is submitted annually with the *Institutional Controls Status Report for the Power Burst Facility and Auxiliary Reactor Area, Operable Unit 5-12, for the Year 2002* (DOE-ID 2002c) being the most recent. These reports address the current status of institutional control measures required by the OU 5-12 ROD (DOE-ID 2000a), and include a record of recent inspections, site histories, brief profiles of contaminants, summaries of the disposition status for waste generated, and summaries of future actions for OU 5-12.

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